THOMAS L. KANE
Publisher

o o o

R. M. GIBBS
Business Manager

o o o

B. H. HAYES
Production Manager

C. E. ELLIS
Promotion Manager

O. L. JOHNSON
Manager Market Research

o o o

CHARLES T. POST
Manager Circulation and Reader Service

o o o

Executive Offices
Chestnut and 56th Sts.
Philadelphia 39, Pa., U.S.A.
Editorial and Advertising Offices
100 E. 42nd St., New York 17, N.Y., U.S.A.

o o o

Regional Business Managers

FRED BANNISTER, W. Hartford 7, Conn.
ROBERT F. BLAIR, Cleveland 14, 62 La Salle Road
1016 Guardian Bldg.

C. H. OBER, H. E. LEONARD, New York 17, 100 East 42nd St.
PEIRCE LEWIS, Detroit 2, 103 Pallister Ave.

B. L. HERMAN, Philadelphia 39, Chilton Bldg.
STANLEY J. SMITH, Chicago 3, 1134 Otis Bldg.

JOHN M. HUGGETT, Pittsburgh 22, 814 Park Bldg.
R. RAYMOND KAY, Los Angeles 28, 2420 Cheremoya Ave.

o o o

Owned and Published by
CHILTON COMPANY
(Incorporated)

OFFICERS AND DIRECTORS
JOS. S. HILDRETH, *President*
EVERIT B. TERHUNE, Vice-President
P. M. FAHRENDORF, Vice-President
JULIAN CHASE, Vice-President
THOMAS L. KANE, Vice-President
G. C. BUZBY, Vice-President
CHARLES J. HEALE, Vice-President
JOHN BLAIR MOFFETT, Secretary
T. W. LIPPERT, HARRY V. DUFFY
FRED V. COLE

o o o

WILLIAM H. VALLAR, Asst. Treas.

o o o

Chilton Editorial Board
PAUL WOOTON
Washington Representative

o o o

Member, Audit Bureau of Circulation

Member, Associated Business Papers

o o o

Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price United States, its Territories and Canada $8; other Western Hemisphere Countries $15; Foreign Countries $20 per year. Single copy, 35¢. Annual Review Number, $2.00.

o o o

Cable Address, "Ironage" N. Y.

The IRON AGE

Vol. 160, No. 6 August 7, 1947

Editorial

o o o

Technical Articles

o o o

Features

o o o

News and Markets

o o o

Manufacturer Flies Ryerson Engineer to Plant . . .

and returns him with problem solved

A machinery manufacturer faced an emergency. He was changing over to flame-cut steel plate for many parts previously cast. In the process of change-over, unforseen production problems threatened to stall his entire operation. Committed to a heavy schedule of deliveries, he saw the threat of reduced volume as an inconvenience to customers—a mark against his company.

Moving swiftly against time, he called Ryerson in a neighboring state, offering to send his company plane if a Ryerson specialist would make a flying trip to his plant. We agreed, and, in a matter of hours, a Ryerson engineer was on the spot giving practical assistance.

By simplifying several parts, engineering difficulties were avoided. Standardization of other parts reduced cost and made better use of available steel. There was no slow-down in production.

As our specialist was flown back that same day, he made out a report covering his activities. It was brief enough. It read: Customer service.

That brief report—customer service—sums up the reason so many steel users make Ryerson the first source for steel from stock and turn to us in time of trouble. Despite steel shortages there is no shortage in our willingness and ability to cooperate. Our technical men will gladly work with you on any steel problem, or assist in the search for a suitable alternate when needed steel is not available.

Remember that Ryerson facilities and experience are always at your service when you call.

JOSEPH T. RYERSON & SON, INC.

Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles.

RYERSON STEEL

The IRON AGE
100 E. 42ND ST., NEW YORK 17, N. Y.

ESTABLISHED 1855

o o o

August 7, 1947

o o o

THOMAS L. KANE
Publisher

o o o

T. W. LIPPERT
Directing Editor

Editorial Staff

News, Markets Editor T. C. CAMPBELL
Technical Editor.....W. A. PHAIR
Machine Tool Editor...H. E. LINSLEY
Metallurgical Editor...E. S. KOPECKI
Ass't News Editor...G. F. SULLIVAN
Art Editor .....F. J. WINTERS

o o o

Associate Editors
JACK R. HIGHT
H. W. VAN CAMP
E. L. SCHIMKO

Editorial Assistants
M. M. SCHIEN
C. R. MUNZER
J. P. O'CONNOR
R. E. BENEDETTO
A. D. STOUT, JR.
L. L. BRASS
E. K. FAISANT
D. L. WELLING

Foreign Editors
England (Contrib.)....F. H. HARLEY
49 Wellington St., Strand, London, W. C. 2, England
Canada (Contrib.)...F. SANDERSON
330 Bay St., Toronto, Canada
Paris (Contrib.).....PIERRE BENOIT
59 Rue Manin, Paris XIX, France

Regional News and Technical Editors
T. E. LLOYD
Pittsburgh 22
814 Park Bldg.

D. I. BROWN
Chicago 3
1134 Otis Bldg.

JOHN ANTHONY
Philadelphia 39
Chilton Bldg.

EUGENE J. HARDY
KARL RANNELLS
GEORGE H. BAKER
Washington 4
National Press Bldg.

W. A. LLOYD
Cleveland 14
1016 Guardian Bldg.

W. G. PATTON
Detroit 2
103 Pallister Ave.

OSGOOD MURDOCK
ROBERT T. REINHARDT
1355 Market St., San Francisco 3

R. RAYMOND KAY
Los Angeles 28
2420 Cheremoya Ave.

Editorial Correspondents
ROBERT McINTOSH
Cincinnati

L. C. DEAN
Buffalo

G. FRAZAR
Boston

HUGH SHARP
Milwaukee

JOHN C. McCUNE
Birmingham

ROY EDMONDS
St. Louis

JAMES DOUGLAS
Seattle

Why the Weeping Wood?

OF all the postwar anomalies in commodities, the most incongruous is rubber. Among American consumers there is a mute but solid core of disapproval, and producers of rubber goods and operators of synthetic plants are equally unhappy in a quiet sort of way. The dictatorial role of government seems unnecessarily muddled and appears to make little sense even on the basis of self-interest. The most charitable observation would be to assume that the demands of high policy are so urgent elsewhere as to leave little energy to pick up this loose end and devise a realistic and satisfying synthetic rubber program.

Industry has shrugged off most wartime controls with understandable belligerency. But the rubber order (R-1) operates under the cloak of what could almost be termed a conspiracy of silence. This Order is not a simple affair—it lays down strict specifications as to the proportional use of natural and synthetic rubber for practically every article turned out by industry. Thus, this Order affects the pocketbook of about every person in the country. Under its protective umbrella most of the country's synthetic rubber plants—those with high as well as those with low costs—are running full tilt. Even existing synthetic stocks are declining. At the same time, natural rubber supplies are building up rapidly outside the country. The price of natural rubber is, of course, reflecting the bearish pressure of this stock accumulation.

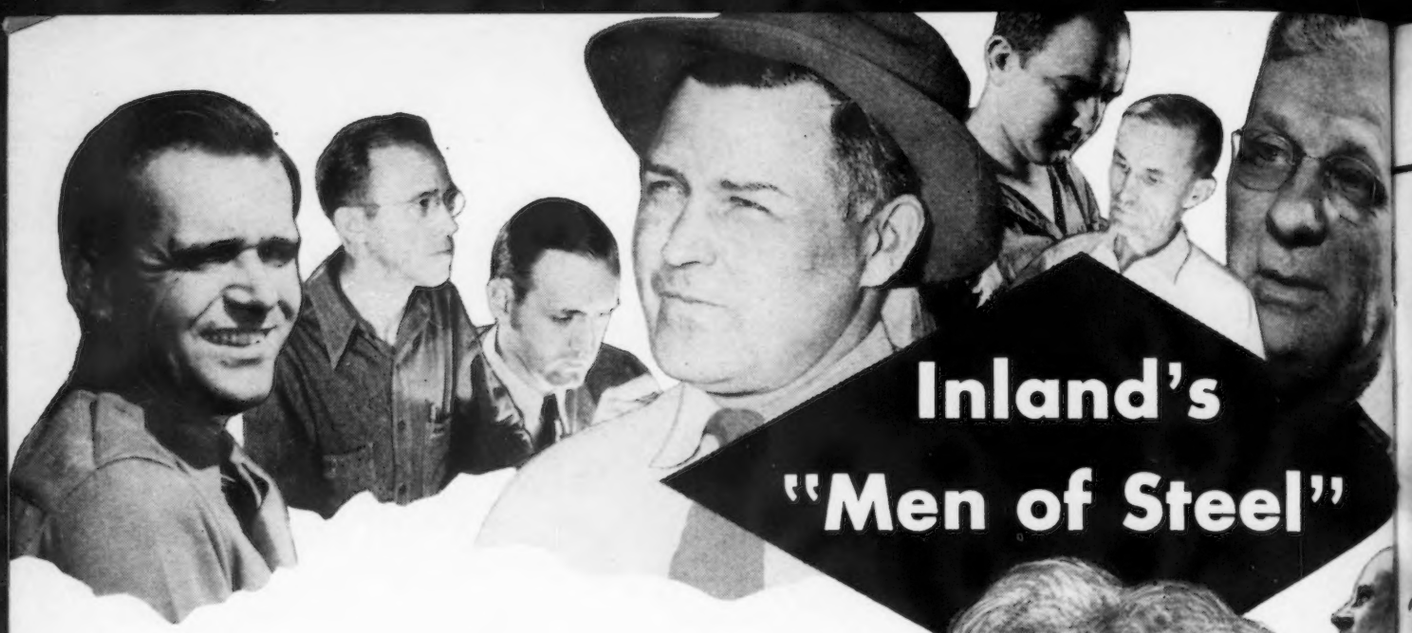
The protective policy for synthetic rubber far exceeds strategic requirements. The Batt Committee has recommended a synthetic output, based on petroleum, of 250,000 tons yearly as a matter of strategic policy alone. It is suggested that high-cost synthetic plants, and at least one using alcohol as a basis material, should be closed down but maintained in standby condition. But, synthetic production is now running at a rate of over 700,000 tons yearly. Assuming no alteration in consumption, the year's end will find synthetic stocks down to less than one month's supply, while natural rubber stocks outside the country would total over 1,000,000 tons, or just about a year's normal supply. It goes without saying that some rather significant price differentials are involved in the maintenance of this unbalance.

Manufacturers have had little sympathy with this policy but have been rather loath to whip up public resentment against Order R-1. Organized opposition could conceivably snowball to such an extent as to panic a removal of all restrictions. Thus they would be hoist with their own petard. The supports for synthetic could well collapse and the demands on natural rubber mount to such a point as to create an embarrassing shortage. Such a situation could lead to some nasty competitive struggles and runaway prices.

Although a great deal of advertising effort has been expended to convince the American user of automobile tires that synthetic mixtures have no peer, there is almost universal nostalgia for the half-remembered all-rubber tire of old. As regards other rubber goods for general consumption, some of the wartime mixtures that were palmed off as rubber could hardly be classed as the best of sales promotion.

The interests of everyone would seemingly be best served if Order R-1 were to be modified in such a way that limitation would only be set on the country's total monthly importations (or consumption) of natural rubber. Thus could the minimum strategic synthetic activity in the country be assured of protection. At the same time both the consumer and manufacturer would recapture their freedom of choice—a principle on which any dynamic economy must be based. The government would then have no choice but to turn synthetic productive facilities back into private hands. Relieved of the necessity of continued pooling of knowledge and patents, the more aggressive producers would have incentive to push new technological improvements to a point where synthetic acceptance in the general field could win laurels equal to those that have long existed in many specialized applications.

T. W. Lippert



Inland's "Men of Steel"

These are typical steelmen who make your Inland steel. Competent, self-reliant, experienced men, they have devoted their lives to steelmaking. You'll find them everywhere in Inland's plants . . . on the ore docks . . . tapping blast furnaces . . . charging open hearths . . . supervising rolling operations . . . running tests in Inland laboratories. All are working to a common purpose . . . to produce steel of the highest quality—steels they can be proud of. It is men such as these . . . Inland's "men of steel" . . . who make the steel you can depend on.

INLAND STEEL

INLAND STEEL COMPANY
38 S. Dearborn St.
Chicago 3, Illinois

Sales Offices: Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul

► Latest gray market steel prices include sheet bars at $92. A certain rolling mill will buy sheet bars for $39. In return the seller gets sheets rolled from half the sheet bar tonnage he supplied. The sheet price is $50 above published mill prices.

► U. S. Government cooperation with the 44-nation World Monetary Fund's drive to abolish gold black marketing probably won't help much. Tighter U. S. export regulations won't affect Russia, believed to be the world's second largest gold producer. The USSR is still expanding gold production and through the black market she can acquire much needed foreign exchange.

► The steel price rise may make it easier for some companies to go into areas from which they have withdrawn. Due to high demand, many companies have quietly stopped selling in areas where they considered their freight absorption too high to be competitive.

► The automobile industry has been keeping more than one assembly line running by interplant air shipments, but among the more interesting are shipments of steel sheets from Detroit to a parts plant and return of the finished product by air. Veteran-owned cargo "lines" handle a big chunk of this traffic.

► Despite price increases in coal, coke, pig iron and steel, there will be no boost in iron ore prices during the 1947 season, according to reliable sources within the industry. But an increase is possible when the first cargo comes down the lakes next spring.

► Though foundry consumers of red brass ingots generally prefer smooth top ingots--which are produced by means of charcoal deoxidation--some producers believe that rough top ingots give a better indication of certain casting defects in ingots.

► Army-Navy Munitions Board stockpiles of strategic and critical materials are on 55 different military reservations and cover 6 million sq ft of open space and 700,000 sq ft of warehouse space. During the coming year 500,000 sq ft of open storage and 2.8 million sq ft of closed storage will be required.

► A third nuclear reactor, unique in characteristics, is now in the design stage at the Argonne National Laboratory. Existing facilities include two experimental reactors.

► The armed forces are planning to buy up all the excess cutting tools held by WAA, for strategic reserve. Estimated cost is $54 million.

► Though production of rods and wire for screening is increasing, no easing is seen before early 1948. Meanwhile plastic mesh screening, widely used during the war, is becoming increasingly available.

► Despite the calm self-assurance of some steel officials that steel has not overpriced itself, others in the metalworking field believe nonferrous metals will, over the long pull, take good advantage of current steel prices to better their position in competitive markets.

► The word "Dominion" will no longer be used in British constitutional language. It is to be replaced by the term "Commonwealth."

► The House Committee on Expenditures, believing that title to as much as one-eighth of the nation's real property is held by government agencies, will go over federal real estate holdings with a fine-tooth comb during the Congressional recess.

► The steel allocation to the British automobile industry for the second half of this year is reported to be only 30 pct of last year's. About 60 pct of British passenger car output and 40 pct of trucks are now being exported.

► British army invasion locomotives are being repaired in Belgium before being returned to the U. K. for freight use. The 165 now being repaired are the last of a total of 935 sent to the Continent during the war.

► With 2.06 million gross tons of merchant vessels now under construction all over the world, the U. S. stands seventh in the list--between Italy and Denmark--building about 4.5 pct of the total. Great Britain and Ireland are building about 53.6 pct of the total.

Limitations on Pr

By NICHOLAS J. GRANT
Dept. of Metallurgy,
Massachusetts Institute of Technology,
Cambridge, Mass.

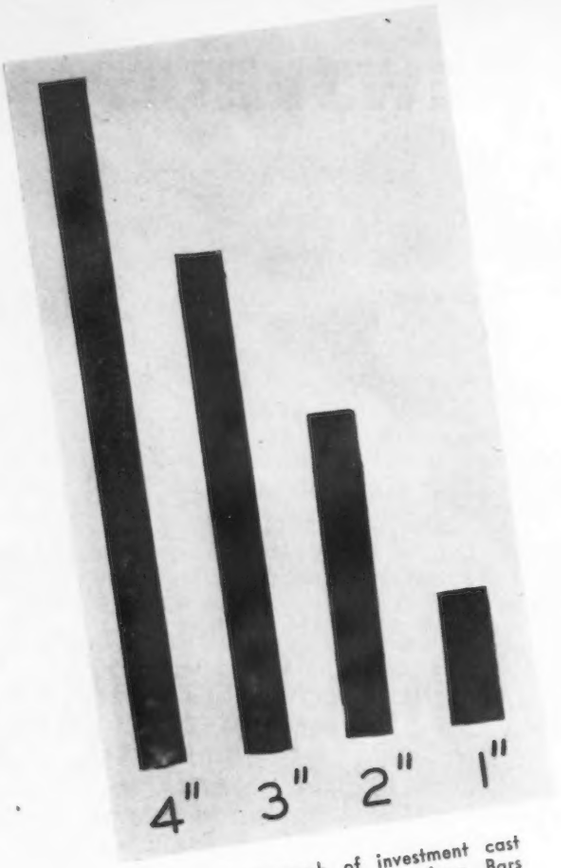


FIG. 1—Radiograph of investment cast 0.280-in. diam bars, 1 to 4 in. long. Bars were machined to 0.10-in. thick flats.

PRECISION casting, the lost wax or disposable pattern casting technique, which might better be described as the hot investment casting process, has been growing by leaps and bounds. A short 8 or so years ago hot investment casting was an interesting though restricted art practiced by jewelers and the dental and surgical parts makers. In the rush to apply the process commercially to alleviate the lack of forging and machining facilities many sound foundry practices were disregarded and are still being disregarded.

"Precision" casting does not always call for precision of dimensional tolerances. Castings made by the disposable pattern technique require one or more of a large number of specified requirements. These specifications include the following: Dimensional accuracy, dimensional reproducibility, shape conformity, surface finish, physical properties and chemistry. Very often none of these is as important as the ability to deliver small numbers of complex parts which are cheap by this technique of manufacture as compared to alternate production processes which involve die costs, machine and handling time, etc.

Very many cast parts require only the fulfillment of a shape factor coupled with good surfaces. Often close chemical specifications are entirely disregarded, as are the physical properties, barring gross errors in either of the former, provided surfaces and shapes are correct. Such castings are simple to make; however, there are many parts which call for rigid control of all specifications. One such item which is of extreme importance is the hot investment cast turbine and jet engine rotor blade.

In casting turbine blades all of the following characteristics are almost equally critical and call for very close inspection and checking. They are: Alloy chemistry, alloy structure, dimensional accuracy and reproducibility, physical properties, surface finish and metallurgical soundness. There appears to be no need of explaining these items separately, some are overlapping in that one cannot be fulfilled unless others are, too. The last item, metallurgical soundness, is one which has received, conceivably, much attention. A closer examination of certain cast parts has indicated, however, that certain important factors have been overlooked.

A forged piece, if the forging practice is correct, is quite uniform, and a test bar whether 0.250 or 0.500 in. diam and whether 2 or 4-in. gage length is quite representative of the balance of the heat. Thus, a forged stress rupture or creep test bar is indicative within close limits of the metallurgical quality of a forged or forged and machined turbine blade.

A cast test bar, however, made by the hot investment technique is not necessarily representative of the metallurgical quality or the properties to be expected in a cast blade if the geometry and size factors are too widely dissimilar and if casting conditions are not properly controlled. Because there has been a tendency to judge the performance of cast blades of certain extreme sizes and shapes on the basis of rupture and creep tests performed on small, sound, easily cast test bars, it is important to point out in the following text the danger of certain conclusions from such tests.

on Precision Cast Parts

Important to the continued growth of the precision investment casting field is a sound knowledge of the limitations, as well as the advantages, of the process. This article reports a series of investigations made on cast turbine rotor blades which indicate that the performance of certain extreme sizes and shapes of blades cannot be entirely evaluated on the basis of creep and rupture tests. The author emphasizes this point by means of radiographic studies and density measurements of sections of various sized blades and suggests that in order to produce sound castings in longer blade sections, a sufficient taper be provided to permit directional solidification of the part.

Two hot investment castings were made of alloy 110VT2-2, a high carbon modified Vitallium alloy whose composition is as follows: C, 1.1 pct; Cr, 24 pct; Co, 65 pct; Mo, 6 pct; Ta, 2 pct.

A mold preheat temperature of 1850°F and a metal pouring temperature of 2730°F were used to cast the test pieces. Straight bars 1, 2, 3, and 4 in. long and all of 0.285 in. diam were cast in the same assembly in duplicate. Two such castings were made to double check the results. The provisions for supplying metal to each bar were standard and the same in all cases. The only variable therefore was the ratio of cross-section to length of the cast bars. From each casting, one of each of the 2, 3 and 4 in. long cast bars was machined into 0.160 in. diam, 1-in. gage length rupture test bars, the 1-in. cast bar being too short to make a test bar.

One set of these bars was tested in rupture at 1500°F at a stress of 35,000 psi while the second set was tested at 30,000 psi.

From one of the castings the four different lengths of bars were ground to leave a center portion about 0.10 in. thick. These four sections were radiographed to note the soundness of each bar and were then cut into sections about equal in size and weight to the 1-in. bar (after grinding to a flat). These sections were checked closely by specific gravity measurements to obtain a measure of the porosity or shrinkage which resulted from inadequate means of supplying molten metal to feed the shrink volume.

Fig. 1 shows the radiograph of the four lengths of bars. The 1 and 2-in. bars appear to be free of shrinkage, while the 3 and 4-in. bars show large shrinkage areas. Table I shows the results of the specific gravity measurements which were made on the top and bottom portions of each bar. These bars were about 1 in. long x 0.25 in. wide x 0.10 in. thick and weighed from 2.5 to 2.76 g. This weight is less than the optimum for such measurements; accordingly only four significant figures were recorded for each density measurement.

The maximum difference in any two measurements of density shown in table I on a given sample is 0.004 units and the average difference is about 0.002 units. On the other hand, the maximum difference between the soundest samples (the 1-in. casting) and the least sound one is 0.047, indicating appreciable porosity in view of the relatively large sample. This

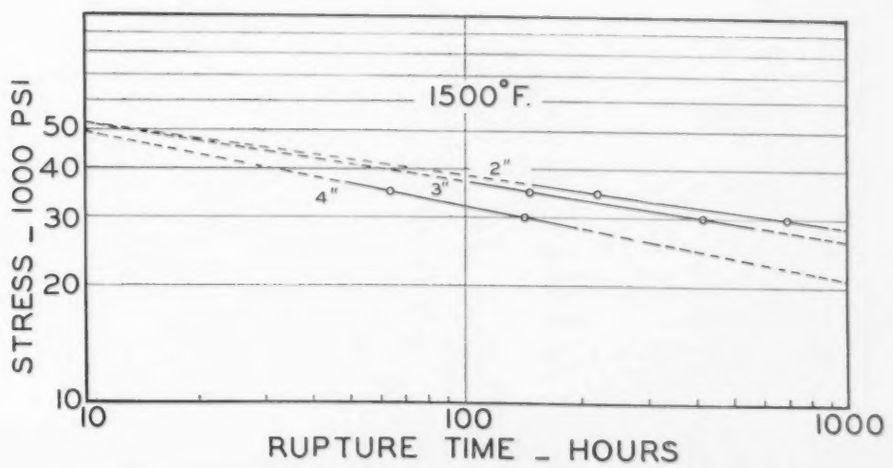


FIG. 2—Log-log plot of stress v. rupture time at 1500°F for investment cast 2 to 4-in. bars.

TABLE I

Density of Cast Bar Sections

Specimen Length, In.	Specimen Position	Avg. Density g per cc	Diff. Among Readings g per cc	Top More Dense by: g per cc
1	Top inch	8.483	0.001	.....
2	Top inch	8.484		0.003
2	Bottom inch	8.481	0.000	.....
3	Top inch	8.483	0.003	0.031
3	Bottom inch	8.452	0.001	.....
4	Top inch	8.464	0.004	0.047
4	Bottom inch	8.417	0.003	.....

The maximum density of the alloy is 8.484 g per cc

TABLE III

Density Measurements of Sections of Turbine Blades

Blade	Sample No.	Average Density g per cc	Maximum Difference of Values in Avg.	Deviation from Maximum Density	Deviation from Maximum Value for Each Blade
D	4	8.772	0.021	.....	Max D
D	5	8.742	0.007	0.032	0.032
A	1	8.723	0.013	0.049	Max A
B	6	8.692	0.018	0.081	Max B
B	7	8.623	0.003	0.150	0.069
A	2	8.615	0.001	0.157	0.108
B	9	8.613	0.009	0.160	0.079
B	8	8.596	0.001	0.177	0.096
A	3	7.563	.....	1.209	1.160

porosity is significantly more important as a smaller and smaller volume is considered under the action of a high stress at high temperatures as the possible source of origin for failure to occur.

Just how significant this measured porosity is, is clearly seen in table II, where the rupture times are shown at 1500°F at stresses of 35,000 and 30,000 psi. The rupture bars (2-in. long) were cut from the bottom 2 in. of the 3 and 4-in. bars to determine directly the harm done to the test piece by the casting porosity.

From table II it is evident that a 4-in. bar of about 0.280 in. diam yields a test bar which shows about 6500 psi less for a 100-hr rupture life than does a 2-in. cast bar. The difference between the 2 and 3-in. long bars is not as great as might be expected because the worst portion of the 3-in. bar went into the thread instead of into the reduced test section. Fig. 2 shows the same results on a log-log plot of stress v. rupture time.

The curve for the 2-in. long bars shows higher rupture values for similar casting conditions than was obtained in hot investment cast 0.250-in. diam rupture bars, the curves of which are plotted in an earlier paper by the author. This difference is due to the fact that in machining 0.160-in. diam bars from the cast 0.288 in. bars the number of grains in the cross-section was reduced to 4 to 6 as compared to 10 to 14 in cast 0.250-in. bars. The elimination of some of the fine grains at the outer periphery by machining produces in effect a cross-section of fewer grains. This structure at 1500°F is stronger than the one containing proportionally more grains in the section.

It is thus apparent that there is a limiting value of the ratio of cross-sectional area to length of the casting in normal castings produced by the hot investment technique which will give a sound metallurgical product. If this is true, then correspondingly there must be a limiting size or design of jet engine or gas turbine blade which can be cast to produce a sound metallurgical product free of porosity and pipe. Unless adequate provisions are made for feeding molten metal to freezing portions of the casting, some porosity is bound to result.

Four different sizes of blades were obtained of the alloy X-40, since this is one of the compositions available in blade form. These four blades are shown in fig. 3.

Normally these blades are radiographed in the positions shown. A considerably more critical radiographic test is provided, however, by cutting out sections of the blades as indicated in fig. 3. This is, of course, a destructive test and can only have restricted use. These cutout portions, shown in fig. 4, represent the heaviest section of each blade. These cutout sections were about 0.125 in. thick. The small type B supercharger bucket (fig. 3 (C)) was too small for convenient testing.

Radiographs of these sections are shown in fig. 5. Section 3 (fig. 4) of blade **B** (see fig. 3) shows a very distinct center line transparency in the blade section. This line is also a sharp junction of grains growing in from each face of the blade. This further indicates that there should be some lesser degree of soundness there, therefore a zone of weakness. Unfortunately radiographs are difficult to reproduce, making fig. 5 less distinct than might be desired.

The section of blade **A** (fig. 3) shows rather severe pipe in the root section of the blade. This could be readily corrected by means of a heavier hot top.

In view of this indicated unsoundness, small

TABLE II

Rupture Properties at 1500°F as a Function of Cast Bar Length

Cast Bar Length, In.	At 35,000 Hours	At 35,000 Pct Elong.	At 30,000 Hours	At 30,000 Pct Elong.	Stress to Rupture in 100 hr	Stress to Rupture in 1000 hr
2	223	6.0	697	5.0	38,500	28,500
3	148	11.5	418	4.0	37,000	26,500
4	63	6.0	143	3.2	32,000	21,000

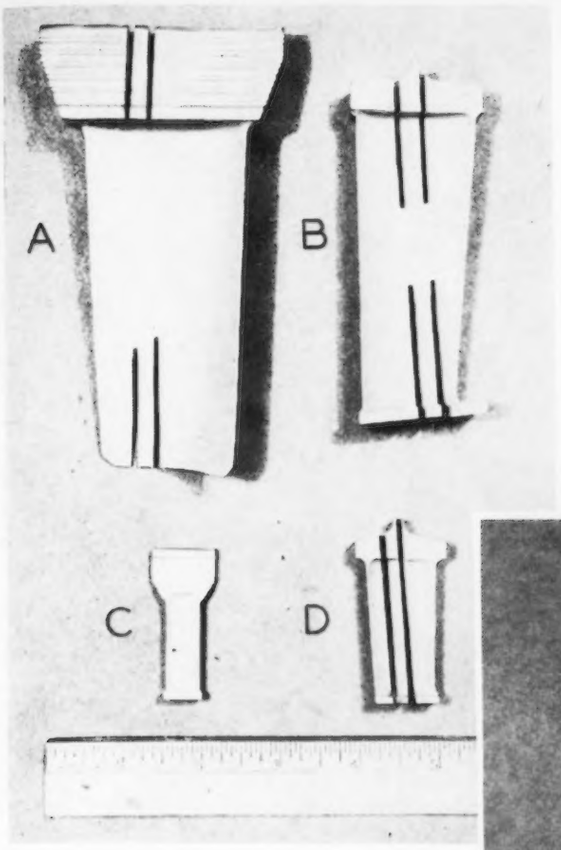
TABLE IV

Rupture Properties of X-40 Alloy at 28,000 psi and 1500°F

(Condition of three specimens: As cast, aged 48 hr at 1350°F)

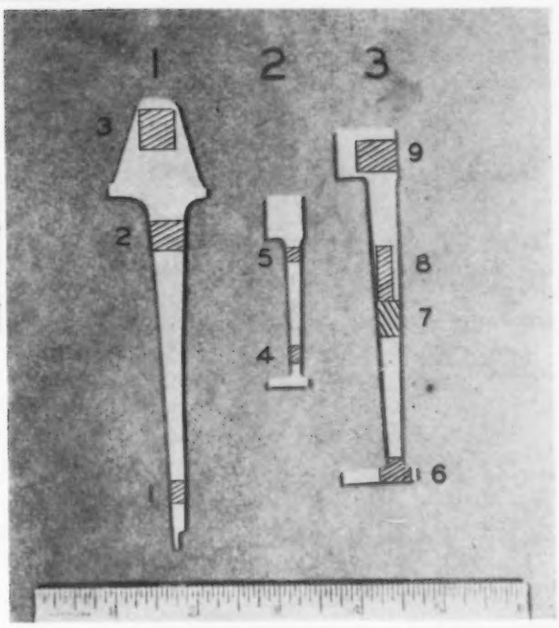
Test Specimen	Rupture Time	Pct Elong.	Pct Red. of Area
Std. X-40[1]	100[2]	20[2]	25[2]
Blade A	50	12.8	20.0
Blade B	55	14.4	26.3

[1] 0.250 in. diam. [2] Average values.



ABOVE

FIG. 3—Four types of turbine blades showing location of cutout sections.



BELOW

FIG. 5—Radiograph of cutout sections shown in fig. 4.

RIGHT

FIG. 4 — Size and shape of blade sections cut out as indicated in fig. 3. Shaded areas show location of samples taken for density measurements listed in table III.

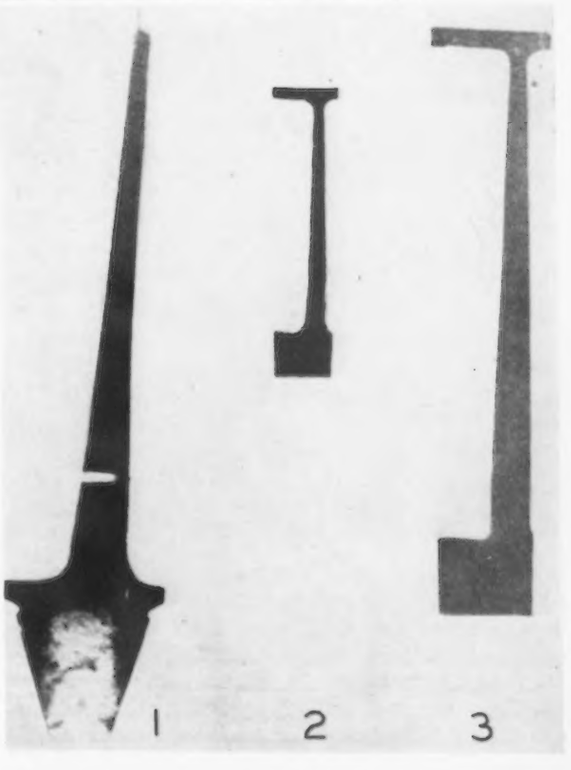
o o o

samples were cut from these blade sections as shown in fig. 4. These sections were much smaller than is normally desired for density measurements; however, it was felt that the differences among the samples would be sufficiently large to overshadow the decreased accuracy due to the small samples. Table III summarizes the results of the density measurements.

Since all of the blades were not cast under exactly the same conditions and since there are small differences in composition, the data in the fifth column of table III are not as significant as are those in the last (sixth) column. The maximum density values of the samples from each blade are used as a standard of comparison, although undoubtedly these values are not the true maxima. Nevertheless, the deviation from this arbitrary standard in the case of blade **B** is about 1 pct for a full section (sample No. 9) and is 1.1 pct for sample No. 8 which is a reduced section exaggerating the defect. In blade **A**, sample No. 1 showed maximum density. Sample No. 2 higher up in the blade, nearer the large end, shows 1.2 pct lower density—a very appreciable quantity. In blade **D**, the smallest of the three, there was little difference between the two samples measured. The deviations from the maximum measured values are greater in the blades than was observed for the cast bars. Part of this is due to the larger sample used in the case of the bar sections which averaged the defects over a larger volume whereas the sections from the blades are small and the defective area constituted a larger portion of the total sample.

As a source of failure initiation or failure progression, however, the decreased density values indicate a dangerous condition.

These blades did not offer a convenient section for a test bar, nevertheless 0.160 in. diam



o o o

(1.25 in. gage length) rupture test bars were machined from each of the large blades from the sections shown in fig. 3. The threads were not complete but did manage to hold up for the tests.

The results of rupture tests at 28,000 psi and 1500°F on the test bars from the blades and for a standard X-40 precision cast test bar are shown in table IV.

Table IV indicates that the poorer rupture properties of the blade test bars are associated with the lower density of the test sections. Actually it is felt that the value for blade A is too low by comparison with blade B in that blade A showed a grain size at least 50 pct finer than blade B. This finer grain size would naturally result in a lower rupture life.

Lest it be construed from table IV that cast blades cannot be made comparably strong with cast test bars, it must be pointed out that both of these blade test bars are representative of the poorest section of the blade. On an overall average the deviation of rupture properties in a blade from a standard 1.25-in. long x 0.250-in. diam test bar would not be as great.

The most important item to be noted from these tests is this: There are size and shape limitations for cast blades which are consistent with standard foundry principles regarding gating and risering for proper feeding of liquid metal to shrinking solidifying sections. The problem of proper feeding of liquid metal can, of course, be further improved by going into centrifugal casting compared to pressure casting. Larger hot-tops will help still more. Most important of all, however, is the requirement that in longer blade sections a sufficient taper be provided in the blade section to permit directional solidification to produce a sound casting. An added item of great importance, which has not been discussed here except for brief mention, is the grain size distribution across the blade and its effect on the subsequent rupture and fatigue resistance.

Production Drilling With a Universal Machine

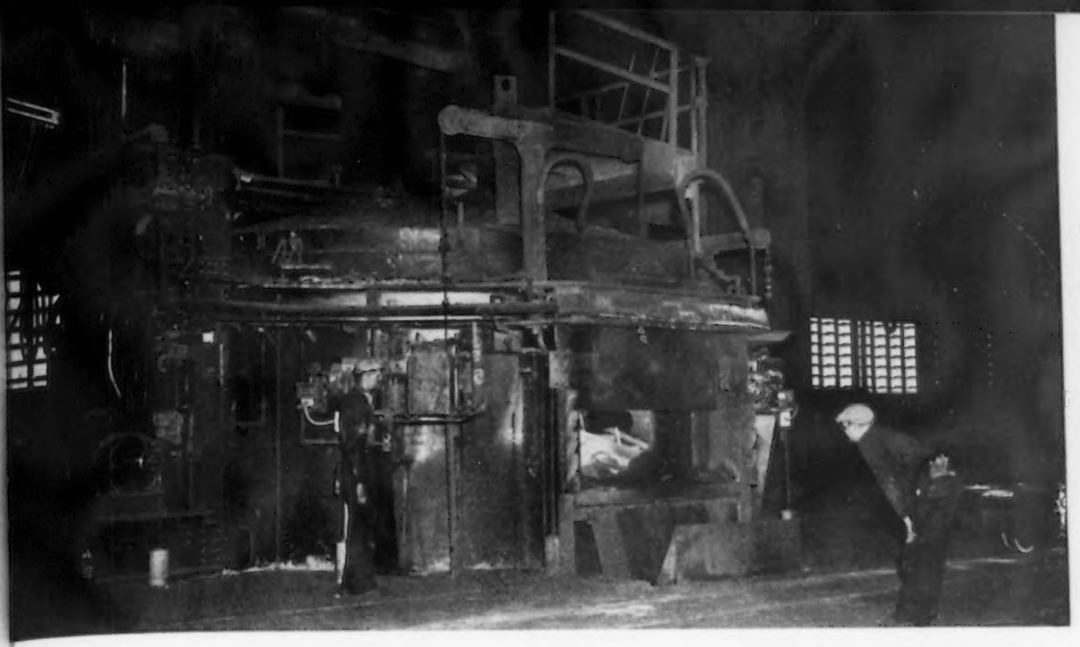
ONE of the chief objections to the use of special purpose drilling machines has been the fact that continuous operation is essential if the relatively high initial cost is to be justified. For job lots running into only a few thousand pieces, the special machine would be advantageous from a production standpoint, but decidedly undesirable from a cost standpoint, since it would have to be discarded when the run was completed. For the next run on a different part it would be necessary to purchase a new machine or rebuild

the original one at approximately the same cost.

This objection appears to have been overcome by the introduction of what may be termed a universal special machine. Introduced by Churchill, Inc., Chittenango, N. Y., and known as the Tri-Tec Universal drilling machine, this piece of equipment is designed for group or pattern drilling, reaming and tapping holes at any required angle. As shown in the accompanying illustration, the machine consists essentially of a cylindrical base to which a number of arm supports are attached. These supports are adjustable radially into any desired position. Each support carries an arm, adjustable vertically, and on each arm a drill head may be carried. These heads are adjustable toward or away from the center of the machine and are equipped with swiveling supports to allow of angular adjustment from 45° above to 45° below the horizontal.

The pieces to be drilled are located in suitable jigs, chucks or collets mounted on a faceplate which rotates on a spindle passing through the center of the base. Geared to this shaft is an index plate having a number of holes corresponding to the number of holes to be drilled in one revolution of the spindle. Also attached to the spindle is a drum in which holes are drilled to correspond to the desired pattern or grouping arrangement to be drilled in one revolution. Mounted on a support bracket in the base of the machine and covering the surface of the drum is a group of switches. These switches are actuated when the proper hole in the drum comes in contact with the switch arm. When the switch is closed a solenoid is actuated, causing a switch or valve to be opened and the drill head to move forward, drilling the desired hole. As the drum continues to rotate, other switches are actuated, causing the corresponding heads to operate and complete the operational pattern.

An interesting feature of this machine is the tool torque control designed to pick up any excess torque pressure applied to the point of the tool and transmit it to a reversing mechanism. This brings the tool out of the workpiece, allowing it to clean itself. The drill then advances rapidly to the depth to which it had penetrated and slows down to drilling feed before starting to cut. This allows the machine to be used for deep hole drilling where it may be necessary to clear the drill several times.



o o o

CHECKING meltdown on a rimmed heat at the South Works of Carnegie-Illinois Steel Corp. Carbon reduction in this practice is effected with oxygen.

o o o

Electric Furnace Rimmed Steel

Production of rimmed steel in the electric furnace, using oxygen for carbon reduction, as practiced at the South Works of Carnegie-Illinois Steel Corp., is described in detail in this article. Utilizing all scrap charges, 80-ton heats are being tapped out in an average time of 7 hr from tap to tap. Some comparisons between openhearth and electric furnace practice for comparable grades of steel are given by the author.

o o o

By D. I. BROWN
Chicago Regional Editor
THE IRON AGE

o o o

SOFT, low carbon rimmed steel, long a product of the openhearth, is now being successfully made in large tonnages in basic electric furnaces. These furnaces until recently have always been used solely for the making of alloy and stainless steel wherein the quality requirements are very restrictive. The departure from conventional practice is largely due to pressing demands for more carbon steel. The switch is probably temporary but the experience being gained in the new melting procedures is proving to be extremely interesting from both a metallurgical and commercial aspect. The practice outlined in this article differs from that previously reported[1] in that oxygen only is used for carbon reduction in this practice.

Right from the charge to tap the electric furnace and openhearth practices for making carbon steel are different, although the end product is practically the same. No longer are the slag reactions all important. Sufficient temperature is not a problem in the arc furnace and the electrics do not have bottom trouble, except that the bottoms have a tendency to build up. Heats of 0.08 pct C max are made using no ore at all, and heats as high as 0.23 to 0.28 pct C are caught on the way down—no block and usually no recarb. The exact carbons are tapped from the furnace with all the low carbon 80 pct ferromanganese added in the ladle. Rimming action is very good despite the fact that no ladle recarburization is ordinarily used.

[1] *See "Melting Rimmed Steel in the Electric Arc Furnace,"* THE IRON AGE, Sept. 26, 1946, p. 62.

The practice discussed here is that developed at the South Chicago works of the Carnegie-Illinois Steel Corp. This shop is tapping 80-ton heats with an average time from tap to tap of 7 hr. The furnaces, Heroult type, are charged entirely with scrap, plus 400 lb of crushed coke and 1500 to 2000 lb of burned lime. Back charging is em-

ployed after partial melt down. On the back charge 50,000 to 60,000 lb of light scrap, preferably bundles, is most desirable but, due to physical conditions, practice varies. Usually complete melt down occurs in 4 to 4½ hr depending on the grade of scrap available.

Carbon reduction in this shop is accomplished solely through the use of oxygen.[2] A ½-in. steel pipe wrapped with wet ganister is inserted through the peep hole (see fig. 1) and the outlet of the oxygen stream impinges at the slag-metal interface. Heat is therefore introduced in the bath rather than into the furnace atmosphere. Thus, the usual melting from the bottom up is speeded in addition to faster carbon reduction. The wet ganister hardened by heat increases the burning life of the lance which would otherwise burn off in a matter of minutes.

[2] *Previous discussions of the use of oxygen for carbon reduction appearing in* THE IRON AGE *include "Use of Oxygen in the Openhearth Bath," Feb.* 20, 1947; *"Use of Oxygen for Carbon Reduction," May* 29, 1947; *"Oxygen Jet Speeds Openhearth Steel Output," June* 19, 1947.

The line pressure from the Driox system delivers oxygen at 120 lb pressure to the charging floor takeoff. The pressure is then reduced so that the gas is introduced into the heat at 80 to 90 psi.

Because of the all scrap charge the carbon at melt down is low. Melt carbons vary with the type of scrap but the average has been 0.20 to 0.40 C. Optimum carbon at melt is considered to be 0.15 above the desired ladle carbon and is the melt carbon aim in this shop. In Carnegie's practice the oxygen lance is inserted as soon as there is sufficient liquid to form a bath and the large pieces of scrap are not blockading the side door. Melt down proceeds rapidly with the melter taking laboratory tests to check carbon reduction. Usually aside from melt down, one or two checks are sufficient.

The amount of oxygen used per heat is at the melters discretion, as well as how early in the heat the oxygen should be introduced. Because of erratic scrap conditions the use of oxygen differs from day to day and sometimes from heat to heat. On the average, 2000 to 4000 cu ft of oxygen per heat is used, depending on the chemistry to be melted. It has been found that the hotter the heat the faster the carbon can be reduced for a given amount of oxygen. Manganese residuals are also higher on heats which are worked on the hot side.

Strangely, the usual break test employed on the floor of openhearth shops to determine the lower carbon content of a heat has been found in this shop not to be consistent or reliable. A test from an openhearth heat at around 0.08 C always shows unmistakable worm holes in the fracture. At the South Works the tests taken from the electric furnace heats at around 0.08 C have on occasion shown an entirely crystalline fracture without any trace of worm holes or other telltale voids.

Electric furnace practice for rim steel proceeds without any lime boil, flush-off or true ore boil. Melting is carried out using but one slag throughout the heat. Partial slag removal is only used on heats where the sulfur content is found

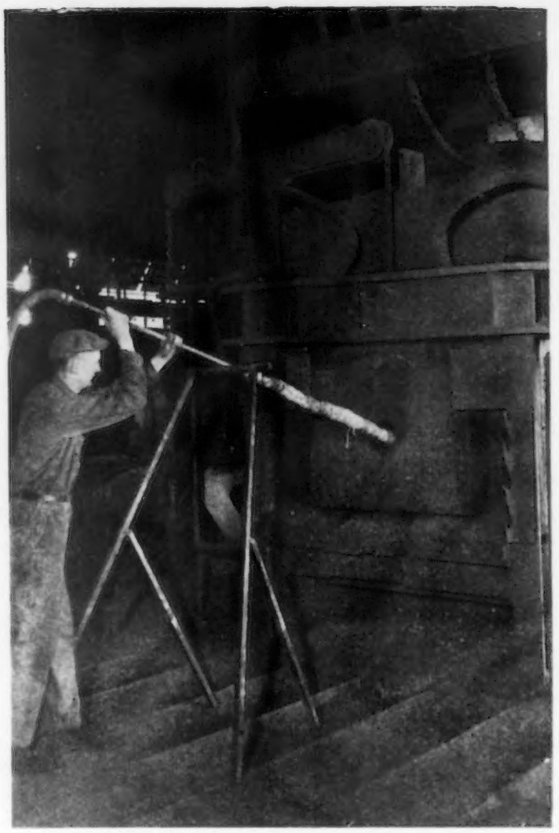


FIG. 1—First helper inserting a ganister-wrapped oxygen lance into a rim steel heat.

to be high on the melt down test. It has been found that precise slag control is not needed and that slag volume is very low by openhearth standards. The average base-to-acid ratio of the slag is 4 to 1.

Electrode consumption is somewhat lower when melting rimmed steel. This is attributed mainly to shorter heat times. The injected oxygen is the cause of the rigorous carbon boil and on low carbon heats the action is much stronger than can be had with standard practice in the openhearth. The FeO content of the slag is checked and adjusted near the end of the heat, this checking being the only real attention paid to slag makeup. The FeO content in electric furnace slag used in making rimmed steels can be much higher than that obtained even in the most highly oxidized openhearth slag. Efforts are made to keep the FeO content of the slag between 20 and 35 pct.

Greatest care is taken to preclude soft melts or heats that meltdown too low in carbon and too highly oxidized to insure good steel. It has been the experience of this shop that once a heat gets soft, or too low in carbon, that pigging up in the furnace or recarburizing in the ladle is a difficult task. One method has been tried which often permits the possible salvage of a soft melt. Manganese fines are sprinkled on top of the slag, then a box of pig iron is immediately charged and dumped on top of the fines. Recarburizing in the ladle with either coke or anthracite coal has not proved to be good practice.

Melters, aside from carefully watching the car-

bon reduction, follow the manganese residual equally as close. In most openhearth shops melting similar grades, the manganese residual at 0.08 C varies between 0.09 and 0.12 pct. In the electric furnace at the same carbon, the ordinary manganese residual varies between 0.10 and 0.30 pct.

Another most important variable in electric furnace practice is alloy residual. The rimmed steel heats are scheduled to follow each other and are not made immediately following a stainless grade where chrome pickup from the hearth would be disastrous. Present scrap conditions are the primary cause of wide fluctuation in alloy residual. In this shop the 80 pct ferromanganese ladle addition is adjusted to compensate for the alloy element, and carbon contents are juggled so that the physicals needed in the final cold-rolled sheets will meet specifications and be identical with the usual openhearth product. The one exception is the 0.08 C max grade (normally a deep drawing grade) in which every attempt is made to keep residuals low.

One popular grade of rimmed steel is cited as an example of the practice used. A rim steel of 0.17 to 0.23 C, 0.30 to 0.60 Mn, normal phosphorus and sulfur, which shows less than 0.20 pct total alloy residual, requires no special aims in carbon or manganese to insure a quality product. If the alloy residual determined by furnace tests comes back above 0.20, the following practice applies on the 0.17 to 0.23 C grade previously mentioned.

Total Alloy Residual Cu, Cr, Ni and Mo, pct	Aim Carbon, pct	Aim Manganese
0.20—0.30	0.20—0.23	0.45 to 0.60
0.30—0.40	0.19—0.22	0.40 to 0.55
0.40—0.50	0.17—0.20	0.35 to 0.50
0.50—0.60	0.15—0.18	0.30 to 0.45

The average sulfur content on approximately 15,000 tons of rim steel made to date has been 0.018 to 0.022. Phosphorus content has been found not to exceed 0.010 pct. In comparisons of the same grades of steel made by either the electrics or openhearth practice, it has ordinarily been found that the nitrogen content of the electric steels is higher. This difference in the nitrogen content is also found in comparing rim steel from both types of furnaces. The usual nitrogen of rimmed grades made in openhearths at South Works runs 0.003 pct, while the electric furnace rimmed heats average about 0.006 pct.

Tapping temperatures at South Works are on the average 25°F higher than openhearth practice for the same grade. The amount of star aluminum added to the ladle varies with the carbon content and pct FeO in the slag. On 0.08 to 0.13 C heats, 0.3 lb of aluminum per ton is usually used. On the 0.08 to 0.13 C types the following table indicates standard deoxidation practice.

FeO in Slag, pct	Aluminum per ton
up to 20	0.3 lb
20 to 23	0.4 lb
24 to 27	0.5 lb
28 and over	0.6 lb

The usual shot aluminum mold additions are used in rimming the steel, and rim action is somewhat more vigorous in electric practice than in openhearth. The drop as the ingot rims in is not any different than standard openhearth ingots. When this shop first started to make rim steel, sodium fluoride was added in the molds in all grades.

In openhearth practice sodium fluoride is usually used on rimmed or capped heats of a 0.10 C and over. The use of sodium fluoride as a scrubber in electric rimmed steels is restricted to heats of 0.15 C and over. In the lower carbon heats, 0.15 and less, the rim action is sufficiently vigorous in itself to permit the ordinary amount of occluded gases to escape.

On the average the type of scrap used in electric furnace melting of rim steel is similar to that used in the openhearth with the exception of size. Due to smaller charging boxes and the restricted hearth area, electrics cannot use the larger pieces of scrap that are ordinarily used in openhearth melting. Considerable care is taken in placing the scrap properly around the electrodes. Although bundled scrap is the easiest to handle in the electrics, its lightweight and the lost space in charging have restricted the use of too much of this type of material.

At South Works, electric furnace ingots weighing from 9000 to 29,000 lb are poured in rimmed steel grades. Various rimmed steels produced at South Works in the electrics include SAE 1006, 1010, 1017 and 1020. The grades are made as commercial quality and the end product is usually cold-rolled sheets. The sheets are used mostly for auto frames, fender aprons, many panels (not deep drawn), wheel stock and similar applications. Surface conditions of the product have been found to be the same as those rolled from openhearth ingots. The yield is also identical to that of openhearth steels. A typical melting sequence for SAE 1020 is shown in table I. Cost of making rimmed steel by this

(CONTINUED ON PAGE 149)

TABLE I
Melting Sequence of a Typical SAE 1020 Heat

5.32 a. m.—First charge—
49 box scrap (low C ord.)—142,000 lb
2 box burned lime—2000 lb
Coke dust—300 lb
6.02 " —Power on
9.18 " —Power off—Back charge—
16 box scrap (low C ord.)—26,400 lb
1 box burned lime—1000 lb
9.36 " Power on
10.20 " Test 0.35 C, 0.38 Mn, 0.011 P, 0.026 S, 0.09 Ni, 0.10 Cr, 0.02 Mo, 0.06 Cu
10.23 " Begin oxygen
10.45 " Finish oxygen—used 3980 cu ft
11.22 " Test: 0.18 C, 0.25 Mn, FeO 27.04
12.00 Noon Tapped, added in ladle coke dust 130 lb
high C FeMn—460 lb

C	Mn	P	S
Specified analysis:			
0.17-0.23	0.30-0.50	0.04 max	0.04 max

Si	Ni	Cr	Mo	Cu
0.10 max		Low as possible		

C	Mn	P	S
Steel made:			
0.23	0.38	0.007	0.022

Si	Ni	Cr	Mo	Cu
0.004	0.09	0.10	0.02	0.06

Time of heat—Begin charge to tap: 6 hr 28 min

Planning a Toolroom Heat-Tr

By R. C. ONAN
Milwaukee District Manager,
Lindberg Engineering Co.,
Chicago

How much will the equipment cost? How much space will be needed? What size furnaces will be required? These and other practical questions are answered in this article. Correlating the capacities of five suggested toolroom heat-treating layouts with capital cost and space requirements of each, the author offers the heat treater a tool with which to accurately estimate his requirements for a variety of heat-treating jobs. Emphasis is also placed, in this concluding part of a two-part article, on the importance of utilizing proper and up-to-date accessory equipment if best results are to be attained.

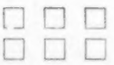
A NUMBER of suggested layouts for laying out the toolroom heat-treating department are presented here to serve as a guide. The arrangement of the equipment is necessarily arbitrary in the layouts presented, and it is recognized that space limitations will necessitate modification in individual instances. For convenience, a set of templates on the various equipment is also included.

While individual requirements will vary from plant to plant, the relationship of the location of various furnaces and accessory equipment on the layouts presented is of importance. Some of the salient points to be considered are as follows:

(1) Aisles between furnaces and quench tanks vary from 4 to 8 ft. Normally a 6 ft aisle is most convenient.

(2) From the standpoint of installation convenience, wiring, piping for atmosphere gas, etc., an in-line layout of furnaces such as

is preferable to



(3) Pyrometers and control equipment can be grouped on panels within the department in one or more groups, where they can easily be observed. They should not be located remote from the department. In tool heat treating temperatures must be changed often and the heat treater must have pyrometers near at hand.

In the first part of this article, THE IRON AGE, *July 31, 1947, P. 40, the author discussed various types and sizes of heat-treating and brazing furnaces and pointed out their relative capacities and applications.—Ed.*

(4) A very practical investment is the use of heavy, oil resistant linoleum in the aisles where there is any possibility of dropping a hardened tool or die. And—there is always this possibility—an untempered piece of work dropped on cement may shatter completely. The linoleum will save breakage and pay its cost many times over.

(5) A modern tool heat-treating department will require the following services: (a) compressed air at 60 to 100 lb, (b) gas supply, (c) power (be certain main transformer capacity is adequate), (d) sewer, (e) water, (f) ventilation, (g) flues, (h) low pressure air (12 to 20 oz) for burners, etc., (i) a convenient storage place for materials, and (j) a steam line for heating soda wash tanks.

(6) If operators looking into furnaces must look at strong light from windows back of furnaces at the same time, shades should be provided or windows may be stippled with flat paint to subdue light. Much work is by the eye, particularly in high-speed steels at temperatures of 2050° and up to 2375°F.

(7) A low ceiling is undesirable in the heat-treating department.

(8) Cyanide or lead pots require strong ventilation to outdoors.

(9) Storage space for incoming and outgoing work is vital so that orderly system can be easily maintained. Likewise storage space must be provided for materials such as fixtures, salt, charcoal, and carburizing pots.

(10) Oil and water quench tanks should be close to each other. Often the heat treater must quench first in water and quickly transfer work to oil quench (note suggested layouts).

(11) Fresh water is most undesirable as a quenching medium—except when it is flushed onto the work. Salt brine (8 to 10 pct concentration by weight) is preferred. Suitable inhibitors are available which can be mixed with

t- Treating Department

o o o

brine to effectively prevent rusting of pipes and tanks.

Accessory Heat-Treating Equipment

The cooling and circulating units shown in the various layouts are of the tube heat exchanger type in which water is passed over tubes through which the quenching medium flows.

These units are selfcontained in that the pump, heat exchanger, controls and strainer are mounted within a cabinet. Various sizes of units are available, and size to be used is based on pounds of work to be quenched in given time, size of batches at one time, and temperature of cooling water.

The coolers are available for oil or brine, although generally in small tool heat-treating departments the volume of work brine quenched does not necessitate the use of a brine cooler. A cooler to handle 150 lb per hr is priced at $450.00 with controls.

An efficient quench tank design for tool as well as production work is shown in fig. 4. It consists of a cylindrical tank provided with a perforated basket which is raised and lowered by means of an air cylinder underneath the tank. In addition, there is a perforated screen which rests on the bottom of the tank and serves to retain foreign matter such as scale or cyanide which might otherwise get into the circulating system.

The basket is controlled by a three-way air valve and can be raised or lowered quickly, or slowly, and can be stopped at any level. Work that is too heavy to be agitated manually can be allowed to rest in the basket while it is being alternately raised and lowered in the oil or water to produce maximum cooling effect. When the work has cooled sufficiently, the operator raises the basket above the level of the quenching medium and before removing allows the work to drain.

In addition to catching the scale and other matter, the screen in the bottom also serves to retain any small parts which might drop through the small space between the basket and the inside wall of the quench tank. Another point of advantage is that this design eliminates chain hoists and overhead tackle. In some locations the air cylinder cannot be put into a pit—and in this case the cylinder is put above the quench tank as an overhead mechanism. Cost of the standard design tank shown in the illustration is $425.00, complete with air valve.

To remove quenching oil or salt from work, a hot soda wash, heated by live steam or gas burners, is a widely used method. A hot water rinse follows the soda wash. For quench oil removal a vapor degreaser can also be used. Commercial models of both soda tanks and degreasers are available from various sources, and prices depend on the type and size selected. A hot soda and hot rinse in toolroom size can be obtained for approximately $250.00. A degreaser of 16 x 22 x 14-in. capacity will cost approximately $300.00.

A hand straightening press can be used in toolroom heat-treating work. Centers are an integral part of the press. Centering heads and support shaft are adjustable as are the blocks upon which the work rests. The latter are movable to and from the screw and are kept in position by tongues which extend into the groove below. The center at the right is spring loaded so that it can easily be drawn back for inserting or removing work. Several standard sizes of presses are available. A press with the capacity to handle stock up to 2½ in. diam, with maximum distance between V blocks 19 in. and between centers 41 in. is priced at approximately $200.00.

A bench grinder is a necessity in any shop for sparking parts as a quick check on type of steel. This will help to prevent disaster as jobs are occasionally mislabeled. Through sparking each piece as standard practice, trouble from mixed

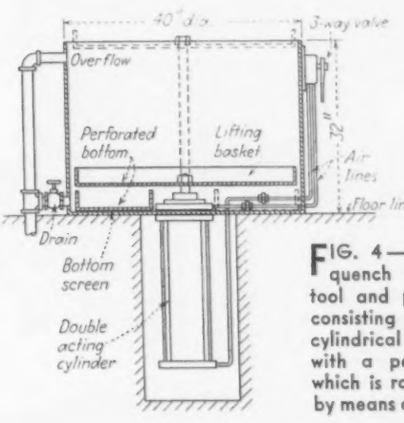


FIG. 4—An efficient quench tank design for tool and production work, consisting essentially of a cylindrical tank provided with a perforated basket which is raised and lowered by means of an air cylinder.

steel can be avoided. A typical 6-in. bench grinder suitable for sparking sells for approximately $45.00.

As a general rule, a wood surface work bench is to be preferred to a steel surface in the tool heat-treating department. The reason is obvious in that there is less possibility of nicking a fine die or hob if it happens to be pushed across the surface of the bench. A steel base is extremely practical and bench surfacing can be installed by a plant carpenter. Bases alone, without woodwork top, range in price from $30.00 to $50.00 depending on size. Price of wood surface will depend on type used, and ranges from $5.00 to $10.00 for maple, plus installation.

Use of proper tongs and tools for handling parts made of high temperature hardening steels such as high-speed steel will help to avoid troubles and oftentimes determine the success or failure of the entire hardening job.

There are several standard types of tongs with which everyone is familiar, but each type should be had in various diameter stock for good work. These are as follows: (1) the flat-nosed tong, made in two types, (2) the hook, (3) the pick-up tong, (4) the round nosed tong, which may be of two types, and (5) the tray tong. These tongs, if available in three sizes, will handle 90 pct of the average tools.

Tools, such as comparatively thin milling cutters, which have a fairly large hole in the center, can be best handled with an inside tong. Pressure on the handle will force the jaws outward, holding the part by pressure of the jaws against the circumference of the hole. The very end of the jaw can be flared out slightly to force its way under the part. Heavy gear cutting hobs are best handled with a sturdy round bar with one end upset to keep the hob from slipping off.

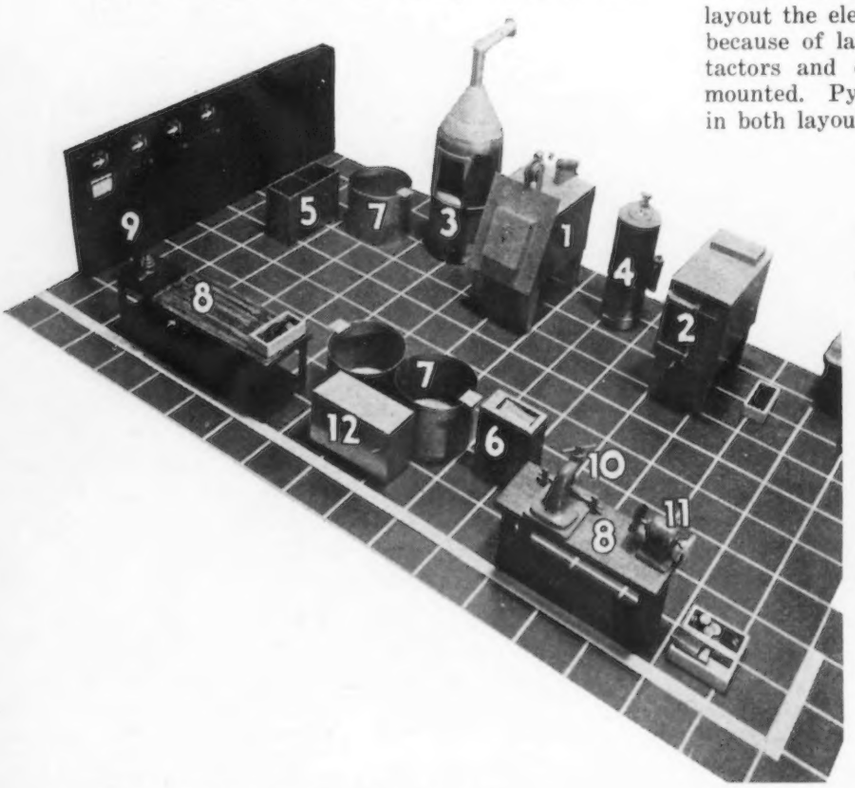
A pickup type of tong used inverted will often support a long reamer or broach. This type of tong can be purchased in moderate sizes for approximately $4.00 to $5.00 per tong, or $35.00 for seven common types. Hooks will cost approximately $1.50 to $2.00, although in the heavier types the cost will be higher.

A detailed description of necessary equipment, uses and comparative benefits, approximate prices, and suggested layouts, associated with specific production requirements, is presented herewith.

Basic Setup for Tool and Die Heat Treating

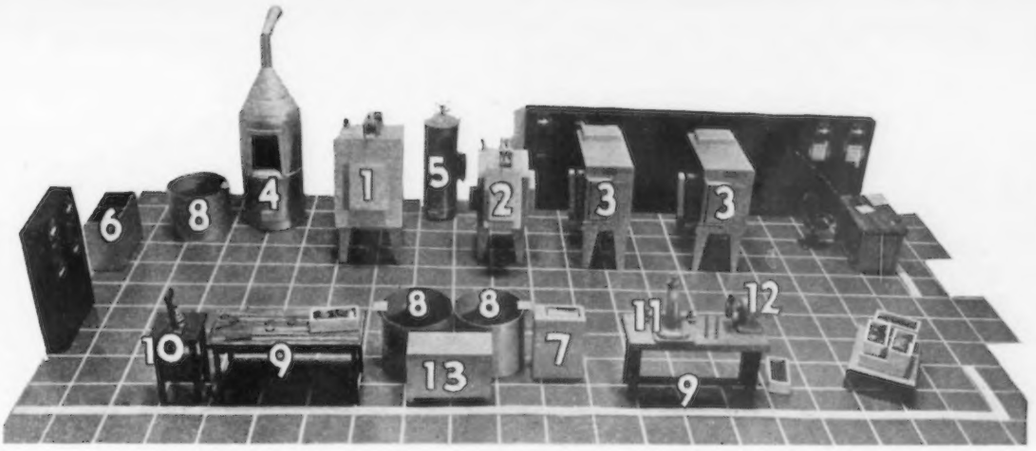
THIS is a setup consisting of a 2000°F hardening furnace, toolroom tempering furnace and pot furnace which can be used interchangeably for salt or lead. A hot salt quench (equipment No. 6) is provided in this and other layouts shown for the reason that this method of quenching saves many a die or tool from breakage. Average quenching temperature is approximately 400°F, and after the part is put into the hot quench and allowed to uniformly arrive at bath temperature, it can be removed and air cooled the rest of the way.

The accompanying layout occupies a space 34 ft long x 18 ft wide. An alternate arrangement (not illustrated) occupies a space 22 x 24 ft and such an arrangement can be utilized where the department must be contained within a square space rather than rectangular space as shown in this illustration. The same equipment is used in both arrangements except that in the "square" layout the electric contactor panels are not used because of lack of wall area. In this case contactors and disconnect switches must be wall mounted. Pyrometer mounting panels are used in both layouts.



Identification and Prices Of Equipment

Equip No.		*Approx. Price*
1	15 x 30 x 12 in. hardening furnace, 2000° F max.	$3,000.00
2	15 x 24 x 18 in. toolroom tempering furnace	2,150,00
3	12 x 18 in. pot furnace	1,650.00
4	Atmosphere generator	900.00
5	Hot soda wash and rinse tank	250.00
6	Salt quench (hot)	2,050.00
7	Quench tanks (3 @ $425.00)	1,275.00
8	Work benches (@ $30.00 and $37.50)	67.50
9	Hardness tester	500.00
10	Straightening press	160.00
11	Bench grinder	45.00
12	Oil cooler	450.00
	Three sets tongs (@ $35.00 each set)	105.00
	TOTAL	$12,602.50



Basic Setup Modified to Include High-Speed Steel

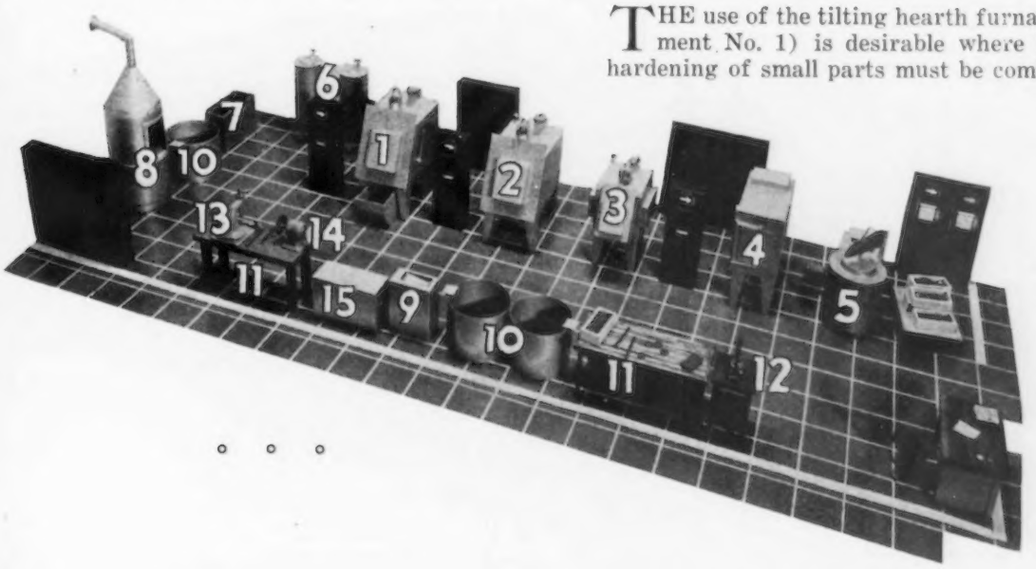
THE layout above includes the same equipment as listed in the basic setup with the addition of a high-heat furnace for high-speed steel and an additional tempering furnace. As in all the layouts presented the location of instrument and electrical panels is dictated by individual requirements. Recording pyrometers are utilized on tempering furnaces so that a time record can be kept. This is desirable for all types of steel, but particularly so when high-speed parts are being handled. Two tempering furnaces are recommended in this layout because lack of tempering capacity is a common handicap in too many shops. What with the double and triple tempering of high-speed parts, one tempering furnace can easily be tied up full time at 1050°F, so a second tempering furnace should be allowed to handle the carbon and oil hardening parts as well as such production tempering as may come along. Space requirements of the layout are 42 x 20 ft. (Each square on floor of layout represents 2 x 2 ft.) An alternate arrangement can be used, with dimensions 32 x 26 ft. including only one tempering furnace.

Identification and Prices of Equipment

Equipment No.		*Approx. Price*
1	15 x 30 x 12 in. hardening furnace, 2000°F max.	$ 3,000.00
2	10 x 18 x 8 in. high-speed furnace	3,300.00
3	15 x 24 x 18 in. toolroom tempering furnace, (2 @ $2,150.00 each)	4,300.00
4	12 x 18 in. pot furnace	1,650.00
5	Atmosphere generator	900.00
6	Hot soda wash and rinse tank	250.00
7	Salt quench (hot)	2,050.00
8	Quench tanks (3 @ $425.00)	1,275.00
9	Work benches (@ $30.00 and $37.50)	67.50
10	Hardness tester	500.00
11	Straightening press	200.00
12	Bench grinder	45.00
13	Oil cooler	450.00
	Three sets tongs (@ $35.00 each set)	105.00
	TOTAL	$18,092.50

Combination Tool and Production Hardening Small Parts

THE use of the tilting hearth furnace (Equipment No. 1) is desirable where production hardening of small parts must be combined with



o o o

tool work. It will be noted also that furnace No. 5, a vertical tempering furnace, is used in place of a second toolroom tempering furnace. This unit has a basket size 16 x 20 in. and handles either tool or production work. It has greater capacity in pounds per hour of production work than the 15 x 24 x 18-in. toolroom tempering furnace. A chain fall or electric hoist should be provided for lifting baskets from furnace. A tandem atmosphere generator is used in this layout as the single generator does not have sufficient capacity to handle the three hardening furnaces. Space requirements for this layout are 50 x 20 ft.

Identification and Prices of Equipment

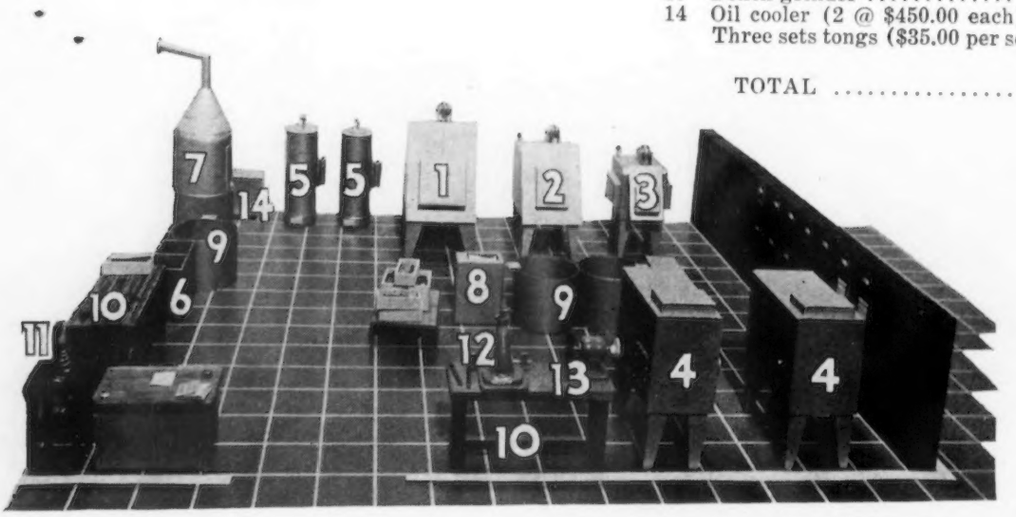
Equipment No.		*Approx. Price*
1	15 x 30 x 12 in. tilting hearth hardening furnace	$ 3,450.00
2	15 x 30 x 12 in. hardening furnace (preheat)	3,000.00
3	10 x 18 x 8 in. high-speed furnace	3,300.00
4	15 x 24 x 18 in. toolroom tempering furnace	2,150.00
5	16 x 20 in. vertical tempering furnace	2,400.00
6	Atmosphere generator (tandem type)	1,400.00
7	Hot soda wash and rinse tank	250.00
8	Pot furnace 12 x 18 in.	1,650.00
9	Salt quench (hot)	2,050.00
10	Quench tanks (3 @ $425.00)	1,275.00
11	Work benches (@ $30.00 and $37.50)	67.50
12	Hardness tester	500.00
13	Straightening press	200.00
14	Bench grinder	45.00
15	Oil cooler	450.00
	Three sets tongs (@ $35.00 per set)	105.00
	TOTAL	$22,292.50

Heavy Tool Work or Production Hardening

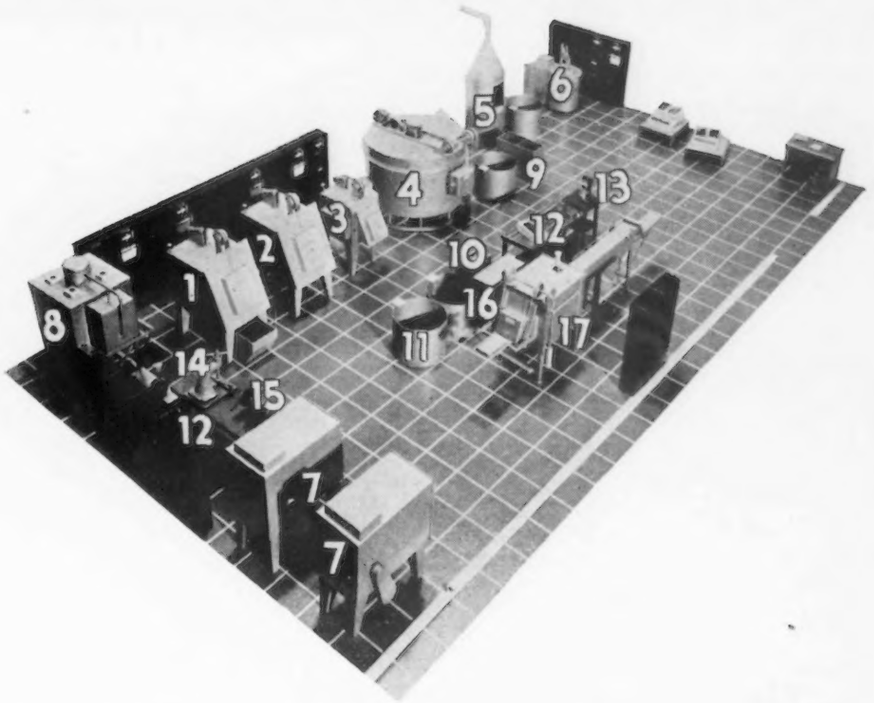
HERE an 18 x 36 x 18 in. furnace is used for either heavy tool work, or production hardening. The 15 x 30 x 12 in. preheat and 10 x 18 x 8 in. high heat are same as shown on the three previous layouts. The space requirement for this layout is 34 x 28 ft., and for an alternate, or rectangular, layout 50 x 20 ft. When the volume of cyanide or liquid carburized work comes into quantity, it is necessary to provide an oil cooling and circulating system for the quench tank, since straight paraffin-oils are used. Compounded oils, as used for tool and production work, should not be used for cyanide quenching, hence the main cooling system cannot be hooked up to take care of cyanide quench tank.

Identification and Prices of Equipment

Equipment No.		*Approx. Price*
1	18 x 36 x 18 in. hardening furnace, 2000°F max.	$ 3,600.00
2	15 x 30 x 12 in. hardening furnace (preheat)	3,000.00
3	10 x 18 x 8 in. high-speed furnace	3,300.00
4	15 x 24 x 18 in. toolroom tempering furnace (2 @ $2,150.00 each)	4,300.00
5	Atmosphere generator (tandem type)	1,400.00
6	Hot soda wash and rinse tank	250.00
7	Pot furnace 12 x 18 in.	1,650.00
8	Salt quench (hot)	2,050.00
9	Quench tanks (3 @ $425.00)	1,275.00
10	Work benches (@ $30.00 and $37.50)	67.50
11	Hardness tester	500.00
12	Straightening press	200.00
13	Bench grinder	45.00
14	Oil cooler (2 @ $450.00 each)	900.00
	Three sets tongs ($35.00 per set)	105.00
	TOTAL	$22,642.50



Combination Tool And Production Heat Treating

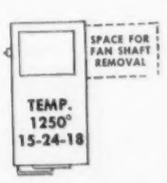


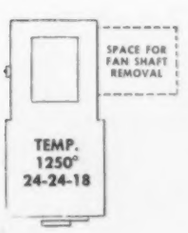
THIS layout is a combination of tool heat-treating and production heat-treating equipment. It embodies the rotary hearth hardening furnace (Equipment No. 4) described previously and a hand pusher brazing furnace (Equipment No. 17). The rotary hearth furnace has a nominal capacity of 150 lb per hr, and will handle a wide range of work. It is ideally suited to parts which must be fixture quenched since it feeds the work to the operator at a steady rate. In addition to the rotary furnace, the 15 x 30 x 12 in. tilting hearth unit (Equipment No. 1) is available for production work. In this layout, two 15 x 24 x 18 in. toolroom tempering furnaces (Equipment No. 7) are provided to take care of tool and some of the lighter production work, and the 16 x 20 in. vertical tempering furnace (Equipment No. 6) will handle the output of the rotary hearth hardening furnace. The hand pusher brazing furnace (Equipment No. 17) is arranged so quenching can be done conveniently when necessary. This unit and other furnaces in layout are supplied with protective atmosphere by an endothermic-type generator (Equipment No. 8).

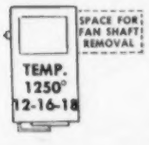
Identification and Prices of Equipment

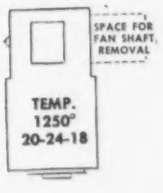
Equipment No.		*Approx. Price*
1	15 x 30 x 12 in. tilting hearth furnace	$ 3,450.00
2	15 x 30 x 12 in. hardening furnace (preheat)	3,000.00
3	10 x 18 x 8 in. high-speed furnace	3,300.00
4	48 in. diam rotary hearth furnace	6,200.00
5	12 x 18 in. pot furnace	1,650.00
6	16 x 20 in. tempering furnace	2,400.00
7	15 x 24 x 18 in. toolroom tempering furnace (2 @ $2,150.00 each)	4,300.00
8	Atmosphere generator	5,100.00
9	Hot soda wash and rinse tank	250.00
10	Salt quench (hot)	2,050.00
11	Quench tanks (4 @ $425.00 each)	1,700.00
12	Work benches (@ $30.00 and $37.50)	67.50
13	Hardness tester	500.00
14	Straightening press	200.00
15	Bench grinder	45.00
16	Oil cooler	1,000.00
17	10 x 24 x 8 in. brazing furnace	4,700.00
	Three sets tongs ($35.00 per set)	105.00
	TOTAL	$40,017.50

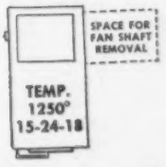
TEMPLATES presented to the right and on the following two pages are for the convenience of the heat treater desiring to layout a proposed heat-treat department. The templates are scaled 3/16 in. to the foot.

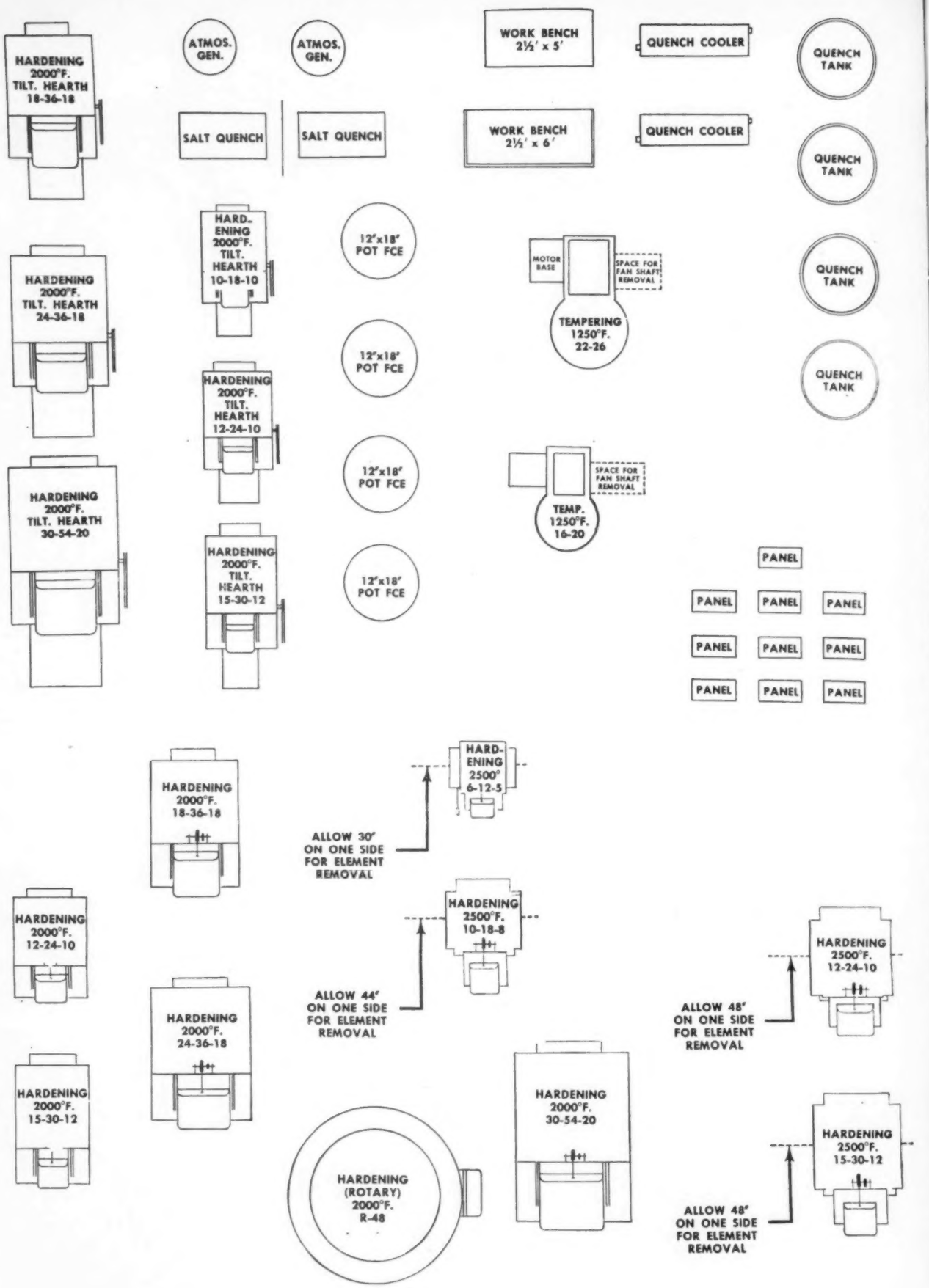


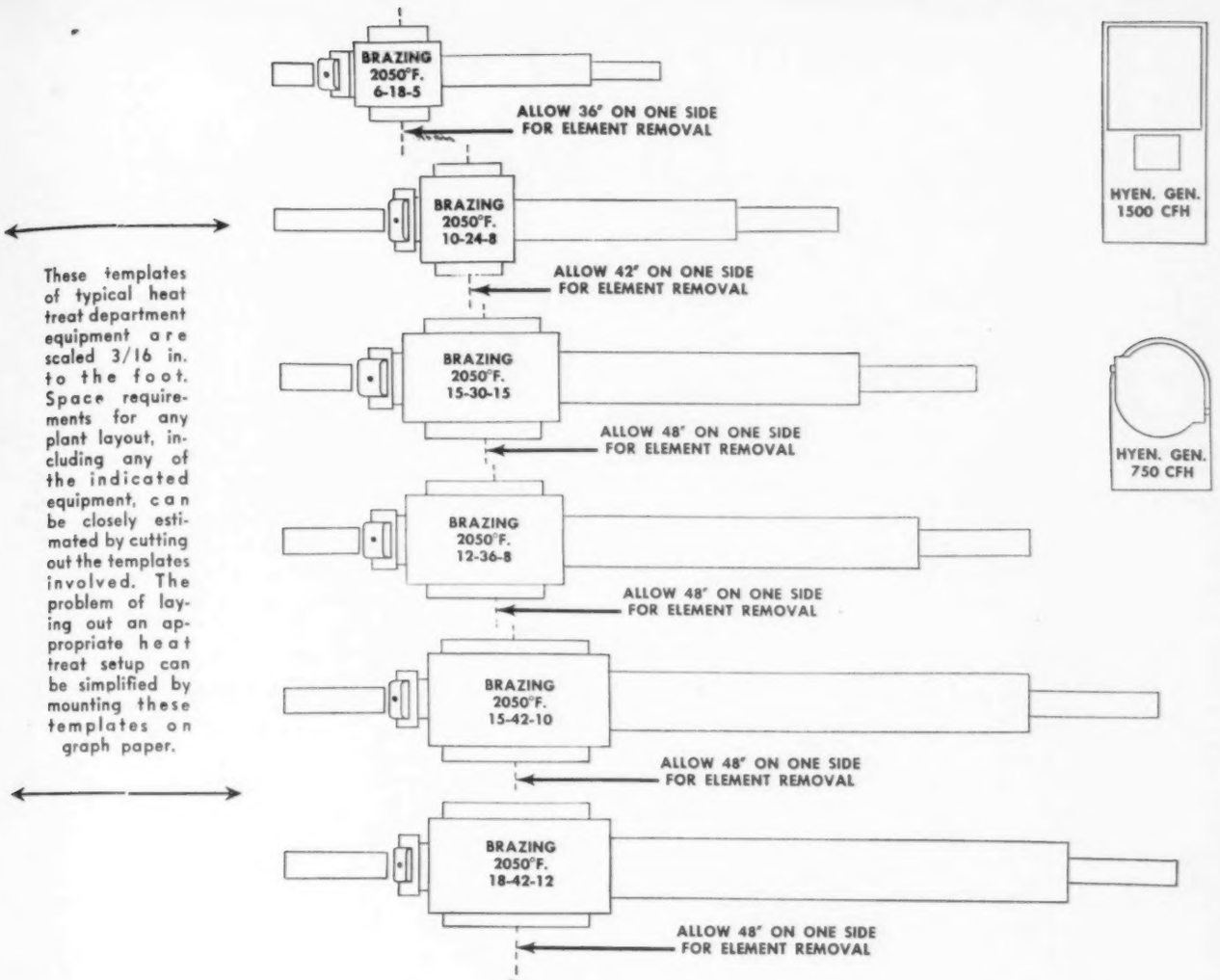









HARDENING 2000°F. TILT. HEARTH 18-36-18
ATMOS. GEN.
ATMOS. GEN.
WORK BENCH 2½' x 5'
QUENCH COOLER
QUENCH TANK
SALT QUENCH
SALT QUENCH
WORK BENCH 2½' x 6'
QUENCH COOLER
QUENCH TANK
HARDENING 2000°F. TILT. HEARTH 24-36-18
HARD.. ENING 2000°F. TILT. HEARTH 10-18-10
12"x18" POT FCE
MOTOR BASE
SPACE FOR FAN SHAFT REMOVAL
TEMPERING 1250°F. 22-26
QUENCH TANK
HARDENING 2000°F. TILT. HEARTH 12-24-10
12"x18" POT FCE
QUENCH TANK
HARDENING 2000°F. TILT. HEARTH 30-54-20
12"x18" POT FCE
SPACE FOR FAN SHAFT REMOVAL
TEMP. 1250°F. 16-20
HARDENING 2000°F. TILT. HEARTH 15-30-12
12"x18" POT FCE
PANEL
PANEL
PANEL
PANEL
PANEL
PANEL
PANEL
PANEL
PANEL
HARDENING 2000°F. 18-36-18
HARD- ENING 2500° 6-12-5
ALLOW 30" ON ONE SIDE FOR ELEMENT REMOVAL
HARDENING 2000°F. 12-24-10
HARDENING 2500°F. 10-18-8
ALLOW 44" ON ONE SIDE FOR ELEMENT REMOVAL
HARDENING 2500°F. 12-24-10
ALLOW 48" ON ONE SIDE FOR ELEMENT REMOVAL
HARDENING 2000°F. 24-36-18
HARDENING 2000°F. 15-30-12
HARDENING 2000°F. 30-54-20
HARDENING (ROTARY) 2000°F. R-48
HARDENING 2500°F. 15-30-12
ALLOW 48" ON ONE SIDE FOR ELEMENT REMOVAL



Ceramic Coatings for High Temperature Service

A NEW type of ceramic coating for the protection of mild steels in high-temperature service, developed during the war, is described in the National Bureau of Standards research paper RP 1773, vol. 38, March 1947, entitled "Ceramic Coatings for High-temperature Protection of Steel."

Laboratory and service tests have shown the coating to be superior to conventional porcelain enamels for high temperature service. The outstanding features of the coating are (1) high resistance to chipping under repeated severe thermal shock, (2) protection of the metal against oxidation during prolonged exposure in air at temperatures up to about 1250°F, (3) freedom from cracking and blistering produced in conventional porcelain enamels under comparable conditions of high temperatures and severe thermal gradients, and (4) a mat surface that does not show highlights and, therefore, decrease the visibility.

To prepare these coatings, a mixture of a special grade of calcined aluminum oxide and a conventional type of ground-coat frit is ground with water to appropriate fineness and is then applied to the metal, dried, and fired according to well-known methods. The coatings may be used on low carbon steel in a thin application of only 0.002 to 0.003 in.

Specifications were issued by the armed services, and the coating was used in regular production during the war on a number of exhaust systems of aircraft and other vehicles, by both the Army and the Navy.

Engineering Significance Of Metals Testing

By BLAKE D. MILLS, JR.

Associate Professor of Mechanical Engineering
University of Washington, Seattle

The importance of metals testing is evidenced by the considerable amount of thought, time, effort and money currently being expended in the development of testing apparatus and techniques. The author discusses several important types of physical testing methods, including tension tests, compression tests, notched-bar tests, high velocity tests, creep tests, and fatigue tests, with particular reference to their correlation with engineering practice. The use of statistical methods for checking material quality is also considered.

WHY are tests of metal necessary? Several reasons are immediately apparent. Designers need reliable data on the performance characteristics of available metals; buyers and sellers of metals need test specifications as a basis for their transactions; and manufacturers of metal products need suitable tests to maintain the desired properties. In the second place, if it is agreed that tests must be made, what tests are necessary and adequate, and what is their significance? These questions are answered tentatively every day, in the light of available knowledge, but research and experience are constantly modifying the best tentative opinions on metals testing.

Serious shortcomings in our correlation of service performance with metals testing practice have been evidenced by such unexpected failures as the brittle fracture of a mild steel hydrogen storage tank below its test pressure,[1] in 1945, and the breaking in two of several steel ships during the war.[2] Postmortem studies of failures such as these have often indicated that there was no single obvious cause for the failure, but that there were a number of contributing factors, which by coincidence were sufficiently additive to have disastrous consequences. The knowledge which could have prevented those failures simply did not exist at the time, and it is still far from complete. The following discussion attempts no comprehensive analysis of metals failures, but endeavors to survey briefly some aspects of the engineering significance of physical tests of metals, relative to their practical usage and likelihood of failure.

There are two general categories of metals tests; those which are intended to indicate performance characteristics, and those which indicate uniformity and soundness. The first category includes such tests as simple tension, compression, notched-bar bending, creep, and fatigue. In the second category are tests of hardness, the detection of surface cracks, and exploration for internal defects. Only tests in the first category will be discussed here.

The Tension Test

The most common test of metals is a tension test, usually involving a specimen with a smooth-surfaced gage length several times greater than the maximum dimension of its uniform cross-section. The properties usually measured in a tension test are strength, ductility, and sometimes the stiffness of a metal. The tensile strength, with a factor of safety determined by the judgment of the designer, has often been the sole property of a metal to be considered in machine design. However, since most metals approach their full tensile strength only after a degree of elongation, which would be prohibitive in practical usage, it is desirable to know the elastic strength, that is, the maximum stress which can be applied and removed without producing too much permanent distortion for continued serviceability.

The tension test is simple to conduct, and the resulting physical properties are easily calculated, but what is their significance in actual usage of the metal? In certain instances, where the piece in question has smooth contours and simple stress conditions not too greatly different from those of the tension test specimen, safe allowable stresses can often be based directly on

the strength measured in the tension test. Such conditions often prevail in structural members; but what of other conditions of service, where heavy stresses may exist in more than one direction, where surface contours may not be smooth, where load may be applied suddenly or repeatedly, or where operating temperatures may vary considerably? A few examples may serve to illustrate the problem.

In a thick-walled tube under internal pressure, for instance, how can the data from a tension test be applied, in order to predict the pressure at which the tube will incur permanent enlargement of its bore, by yielding? A mathematical stress analysis shows that the circumferential tensile stress is greatest near the bore, where there is also a lesser but still very considerable radial compressive stress. (In a *thin-walled* tube the compressive stress would be negligibly low, compared to the circumferential tensile stress.) Can it be safely assumed that the metal at the bore surface will yield only when the tensile stress reaches the elastic strength measured in an ordinary tension test? Without evidence to the contrary, it might seem probable, but actual tests have shown that such an assumption (known as the maximum stress theory) would be badly in error on the unsafe side. The compressive stress, perpendicular to the tensile stress, lowers the maximum tensile stress which can be borne without permanent enlargement of the tube. If, then, the elastic strength measured in a tension test is not a safe criterion of the elastic strength of a thick-walled tube, perhaps it is the *strain* rather than the *stress* which determines the maximum load which can be sustained without yielding.

This assumption has been used a great deal in the design of gun barrels, and is more accurate for such purposes than the direct application of the elastic strength from tension tests, but the error is still considerable and on the unsafe side. As a third alternative, noting that in a tension test the initial yielding occurs along the directions of maximum shear stress, inclined 45° to the axis of the specimen, one may next try *shear* stress as the criterion of practical elastic strength. If one calculates the maximum shear stress which existed when the elastic strength of the tension test specimen was reached, then calculates the maximum shear stress in the thick-walled tube in terms of the internal pressure, and then assumes (maximum shear theory) that the tube will yield when its maximum shear stress reaches the value calculated from the tension test, results are obtained that agree pretty closely with actual experiments.

For many other instances where there are tensile or compressive stresses perpendicular to one another, it will be found that shear stress in a tension test is a better criterion for predicting the conditions under which yielding will occur than is tensile stress. For most engineering purposes, shear stress is a sufficiently accurate criterion, but it has been found that even better accuracy may be obtained by using the *energy of distortion* (per unit volume) calculated from tension tests, instead of shear stress, as the criterion. However, this energy criterion requires somewhat more complex mathematical treatment than does the shear-stress criterion. Under general conditions of stress, where tensile or compressive stress in one direction may or may not be accompanied by tensile or compressive stresses in perpendicular directions, the occurrence of yielding depends essentially on the algebraic difference of tensile and/or compressive stresses in perpendicular directions, calling tensile stress positive and compressive stress negative. (The shear-stress and energy-of-distortion criteria are both consistent with this principle, but they utilize it in slightly different ways.)

It follows, then, that the tensile stress required to cause yielding of a metal member is lowest when there is an accompanying compressive stress in a perpendicular direction, see fig. 1, and it is highest when tensile stresses exist in three perpendicular directions (triaxial tensile stress). The latter situation cannot exist at an unstressed surface, but often occurs within a metal part as the result of shrinkage during cooling, or as the effect of a notch in the surface.

Lest triaxial tensile stress be thought of as a desirable condition, because of the accompanying high elastic strength, let us note the other effects of triaxial tensile stress. It does raise the ultimate strength somewhat above the tensile strength observed in a tension test, but its greatest effect, and an extremely undesirable one, is its reduction of a metal's ductility or ability to deform plastically before fracture. In an ordinary tension test of mild steel, the cross-section necks down to less than half its original area before fracture, and the elongation is large, perhaps 30 pct in a 2-in. gage length. A large force moves through a considerable distance during this test, and the specimen thereby absorbs a rather large amount of mechanical energy before it fails. But imagine a small cubical volume within a mild steel part, stressed so that equal tensile stresses pull on each face of the cube. If the stresses are increased, how much plastic

FIG. 1—The solid line shows how the tensile stress necessary to cause yielding is reduced by compressive stress in a perpendicular direction. The dotted line shows the accompanying shear stress when yielding occurs.

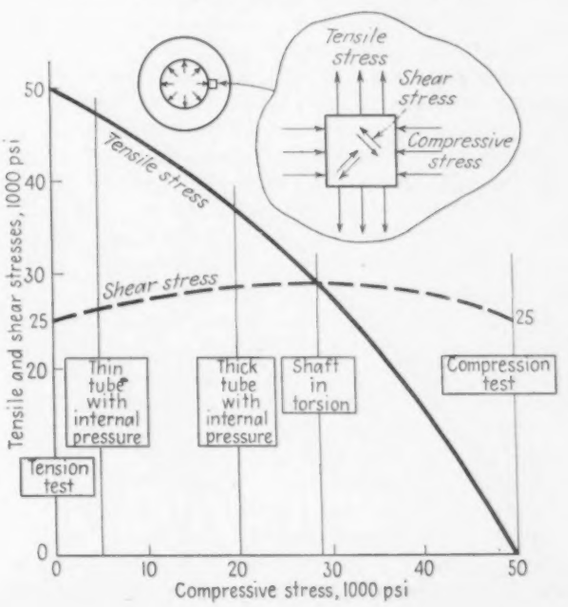


TABLE I

Figures illustrating the marked differences in notched-bar energy absorption which may be exhibited by steels whose ordinary tensile properties are closely similar.[4]

	Yield Point, Psi	Tensile Strength, Psi	Elongation in 2 in., Pct	Reduction of Area, Pct	Charpy Notched Bar, Ft-lb
Steel A....	107,800	133,000	20	50	30
Steel B....	101,500	128,000	23	56	7
Steel C....	68,700	108,800	25	54	14.8
Steel D....	66,000	112,900	23	44	8.5

deformation of the cube will be evidenced before fracture occurs? Practically none, unfortunately, since plastic elongation in one direction would require contraction in a perpendicular direction, and the tensile stresses on all faces of the cube prevent such an occurrence.

Any inequality among the respective triaxial stresses will allow a certain amount of plastic deformation to take place before fracture, but if all three tensile stresses are considerable, the ductility will be much less than is exhibited in a tension test. Brittle failures, then, can and do occur as the result of triaxial tensile stresses in metals which are highly ductile in tension tests.

This fact has important engineering significance, since it shows that under certain stress conditions, even a ductile metal may be unable to relieve localized high stresses by yielding without fracture, and it shows that the energy expended in causing failure then need be only a small fraction of the energy absorbed before failure of the same metal when its ductility is not limited by triaxial tension.

The aforementioned brittle failures of mild steel plates in a hydrogen storage tank and in welded ships appear directly related to the effects of triaxial tensile stress. In neither instance did failure indicate weakness of the welds or of adjacent metal. The failures occurred in brittle fashion, with no evidence of ductility. In the tank, the cracks originated at a manhole of such design that the residual stresses from welding would be expected to be triaxial tension at certain locations, where there was also considerable concentration of stress from the existence of the manhole and from the roughness of a sheared plate edge. In the ships, the cracks usually began at sharp corners of hatch openings in the deck, or at other locations where stress concentration and triaxial tension apparently existed.

It has long been assumed that high localized stresses caused by riveting or welding, in ductile metals, would relieve themselves without damage upon the application of additional stress, and such action usually takes place, but bitter experience has shown that it cannot always be depended upon. At critical locations where triaxial tension is likely to occur, special care must be taken to insure that any sources of stress concentration are minimized. This means particularly the avoidance of sharp reentrant corners, rough edges, and incomplete weld fusion, fig. 2, which may leave internal cracks between welded members. Residual stresses caused by welding can be minimized by careful planning of the welding sequence, and by stress-relief annealing where practicable.

So much for the tension test and the applicability of its results in engineering practice. The test is simple and with proper interpretation is of great value, but its shortcomings must be recognized, and for many purposes it should be supplemented by other types of test.

When metals are used to carry compressive loads, it is often assumed that the compressive strength is at least as great as the strength measured in a tension test. While this is usually a safe assumption, it has been found, particularly for cold-rolled sheet metal, that the directional effects of cold working have left the elastic strength in compression much lower than in tension. The observance of this fact has resulted in the recent development of special testing fixtures which permit reliable measurement of the properties of sheet metal in edgewise compression.

Notched-Bar Tests

If tension tests are made on a conventional ½-in. round specimen of a ductile steel, and on a larger round specimen of the same steel, notched down to ½-in. diam, it is found that the notched specimen has much higher elastic strength, somewhat higher ultimate strength, almost negligible ductility as measured by elongation and reduction of area, and correspondingly very little ability to absorb mechanical energy prior to fracture. To study the energy-absorption ability, or toughness, of a metal in a notched condition such as may unavoidably exist in practice, it is convenient to produce fracture by a single blow rather than by applying load slowly. Like the ordinary tension test, the Charpy or Izod notched-bar test is simple to conduct and the energy-absorption values are easily found, but what is their engineering significance? There is still no universal agreement on the answer to this question, but some important correlations with metals usage have been at least tentatively established.

Energy absorption in a notched-bar test depends on both the strength and ductility of the metal under the particular conditions of stress, temperature, and rate of loading, which prevail during the test. In general, if there is considerable plastic deformation before the bar fractures, the energy absorption will be high. If a relatively brittle failure occurs, less energy will be absorbed. Since brittle fractures in actual practice have occurred so unexpectedly, it is important to have as much knowledge as possible of the conditions under which brittle fractures occur, and the notched-bar test is a valuable tool in this connection.

It is not unusual for two steels, which show almost identical properties in ordinary tension tests, to show more than a two-to-one difference in energy absorption in Charpy notched-bar tests (see table I). How does this correlate with the service performance of the two steels? In many instances, it has been found that unexpected fractures of machine parts correlated with unusually low Charpy values, other factors being

equal. In other instances, relative service performance has sometimes disagreed with differences in Charpy values. It appears that small superiority in Charpy notched-bar tests cannot be depended upon to correlate with superior service performance, but large differences in Charpy values, corresponding to the difference between ductile and relatively brittle fractures, point to definite service superiority for the metals which give ductile fractures of notched bars.

A Charpy notched bar of mild steel at ordinary laboratory temperature, say 70°F, incurs a ductile fracture with considerable absorption of energy. An identical bar of the same steel, tested at −20°F, often incurs a brittle fracture and may absorb only about one tenth as much energy. Ordinary tension tests at the two temperatures indicate no such difference of behavior (see fig. 3). The Charpy test, then, is of value in pointing to the dangerous effect of notches in certain metals at low temperatures, an effect which has probably been a contributing factor in some of the brittle failures of mild steel plates in service.

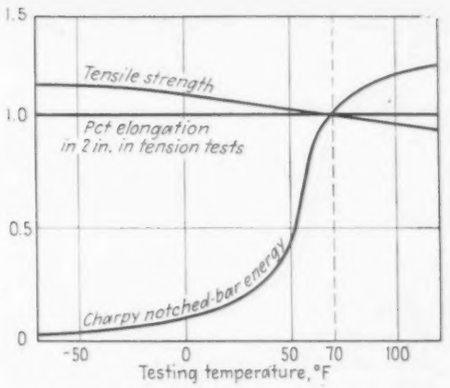


FIG. 3—Graph showing, for one low carbon steel, a marked reduction in energy absorption in Charpy notched-bar tests at low temperatures with no corresponding variation in properties obtained from ordinary tension tests. (Values at room temperature of 70°F taken as unity.)

Effect of Temperature Variation

For many metals, the effect of temperature variation is much greater in Charpy notched-bar tests than in ordinary tension tests. At high temperatures, the notched-bar fractures are usually ductile, and at extreme subzero temperatures they tend to be brittle, but the temperature range over which the transition occurs varies greatly with the type of metal and its heat treatment. In order to minimize brittle failures in service, it is desirable to use a metal whose transition temperature from ductile to brittle failure in Charpy tests is below the minimum temperature at which the metal is to be used.

For many steels, the transition occurs within the ordinary range of atmospheric temperatures, but it can often be lowered below −50°F by suitable heat treatment, or by small changes of alloy content. Certain alloy steels, when heat treated by quenching and tempering, give high Charpy

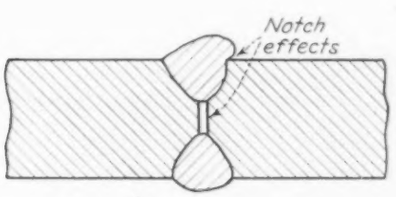


FIG. 2—Sketch showing how imperfect welding can produce notch effects which may cause cracks and brittle failures.

values if rapidly cooled from the tempering temperature, but give low values if slowly cooled from the same temperature. The behavior, known as temper brittleness, is not ordinarily evidenced in tension tests. A temper-brittle steel, then, is one whose transition from ductile to relatively brittle failure in notched-bar tests occurs above the laboratory temperature, when and only when the steel has been slowly cooled from its tempering temperature.

The Charpy notched-bar test has also been found to be a good criterion of whether or not a steel has been thoroughly hardened by quenching. If a steel has been fully hardened by the formation of martensite, and is then tempered to any given strength, it will usually give higher Charpy energy values than will the same steel tempered to the same strength after incomplete hardening.

The differences between metals indicated in Charpy notched bar tests, and not shown by ordinary tension tests, are caused principally by the notch conditions and not by the relatively high rate of loading, about 17 fps. The term impact test, so commonly applied to Charpy tests, is therefore somewhat misleading as to the significance of the test.

High-Velocity Tests

In service usage, metals are often subjected to rapidly applied loads, so it is desirable to know how the strength, ductility, and energy-absorption properties are affected by the rate of loading. In tension tests conducted at high speeds of loading, up to about 250 fps, it was found that both the elastic strength and the ultimate strength increased considerably with the speed of loading. The ductility, as measured by elongation and reduction of area, appeared in most instances to be not greatly affected by the speed of loading. The energy absorption by numerous metals was found to increase slightly or considerably as the speed of testing was increased.

There were marked exceptions in the case of certain metals, however, wherein the energy absorption was greatly reduced at the higher speeds of loading. The published information on the behavior of metals at high speeds of loading is still very fragmentary, and leaves much for the machine designer to desire. At least it appears that the designer can depend on there being no loss of strength up to very high loading rates, and any extra factor of safety which he allows for shock loading may be considered as providing for unexpectedly high

momentary stresses, rather than for any weakness of the metal when suddenly stressed.

Creep Tests

The elastic strength of a metal measured in an ordinary tension test, at any given temperature, is not always a good measure of the stress which can be sustained indefinitely at that temperature without serious permanent deformation. Relatively low stresses of long duration can cause slow but continuing deformation, known as creep, which can destroy the serviceability of a metal member by changing its dimensions or by actual fracture. Lead cable sheathing, with internal oil pressure, and aluminum transmission wire are examples where creep must be considered even at atmospheric temperatures.

Creep of steel at atmospheric temperatures is negligible, but at temperatures exceeding about 800°F, it often overrides any significance of ordinary tension test data. The working stresses to be used in metals for high-temperature applications, then, must usually be based on data obtained from creep tests. The essential factors to be considered are the creep rate at any given stress and temperature, the permissible amount of distortion by creep, and the required length of life of the part. Metal parts operating at high temperatures cannot be designed for indefinitely long life, since there appears to be no stress below which creep stops, at high temperatures. The creep rate of many metals is doubled, at high temperatures, by an additional temperature rise of as little as 10°F.

It is essential, then, that long-time creep tests of metals be made at the actual operating temperatures and stresses, before the service performance under those conditions can be reliably predicted. Extrapolation from short-time creep tests is often necessary, but is dangerous.

Fatigue Tests

It is a well-known fact that many metals cannot sustain millions of applications and removals of stress, even as high as their elastic strengths as measured in ordinary tension tests. Consequently, many tests have been made of most of the common stress-carrying metals to determine the maximum repeated stresses which they can stand indefinitely, or at least for a very large number of cycles, without fatigue failure.

The endurance limit stresses thus determined are listed in many handbooks, but their significance must be carefully considered for application in machine design. The tests are usually made on small, smooth specimens. Service usage where the sections are large, where the surface is not smooth, or where there are abrupt changes in contour, can produce fatigue failures under repeated stresses much lower than the handbook values for endurance limit. However, the effects of size, smoothness, and stress concentration have been studied at length by many investigators, and reliable methods for taking these factors into account have been developed for most practical purposes.

Whether the tests to be conducted are ordinary tension tests, notched-bar tests, or others, their significance is greatly limited unless the test metal is truly representative of the metal which is to give actual service. It is common in metal casting practice to make a tension test of a specimen machined from a coupon gated from, but not integral with, the parent casting. Such a specimen, while often the only practicable kind, shows properties which can usually be considered to evaluate only the condition of the parent metal at the time it was poured. The conditions of solidification and cooling of the coupon are likely to be so different from those of the parent casting, that the properties of the test specimen are no reliable criterion of the properties of the casting.

Design of a Coupon

For any given casting, it may be possible by study and trial to develop a design of coupon whose physical properties are typical of those of the casting, and this should be done where practicable. However, there is no reliable substitute for actually cutting up and testing a few castings to establish the adequacy of the process at hand, for meeting the desired physical properties.

In forgings or castings which are to be machined, additional metal is often left at a convenient location, to provide for tests. However, if the test specimens are taken from too near the surface, they may grossly fail to represent the properties which the part will exhibit in service. If the material is hardened and tempered steel, the hardening may not have penetrated to the interior of the piece. Or as happened in one instance, tests near the surface of large alloy steel forgings indicated sound metal and excellent physical properties, while subsequent magnetic tests of a section through one of the forgings showed myriads of small cracks or flakes. Investigation of additional forgings showed such a flaky interior condition that the serviceability of the forgings was thrown in grave doubt, and the entire lot had to be scrapped, even though the customary tension tests had indicated entirely satisfactory material. Again, it would have been highly advantageous to have cut up one or more of the first forgings made, and to have tested them thoroughly, rather than to depend upon the indications of test specimens taken necessarily fairly close to the surface.

When large numbers of supposedly identical metal parts are being made, it is often impractical to test the metal in every piece. Statistical methods have been developed to a high degree of adequacy, wherein tests of a small percentage of the parts, properly selected, can serve as a reliable criterion of the properties of the parts which are not tested. In one instance, where high quality heat-treated steel forgings were being produced in large quantities, it had been customary to perform tension tests on extra metal provided on each forging. Careful metallurgical and statistical study showed that, when good steelmaking, forging, and heat-treating practice had been established, there was as much variation in physical properties within any single forging as within an entire heat treatment batch.

Tests from the end of any given forging, then,

were no better criterion of the material in the center of that forging than were the tests from another forging of that heat treatment batch. This finding permitted establishment of new test specifications on a statistical sampling basis, without testing every forging, so that the necessary high quality of the forgings could be adequately checked while achieving a marked reduction in the expense and time which had been involved in the testing of every piece.

Careful selection of test metal is almost wasted effort, if the metal in service undergoes metallurgical changes which materially alter its physical properties. During prolonged exposure to high temperatures, in particular, changes may occur which totally invalidate any data from tests made on the original material. A case in point is the sudden failure of a steel steam pipe,[3] in 1942, after it had been at a temperature of about 935°F for 5 years. Metallurgical examination of the fractured pipe showed that a narrow zone of metal, adjacent to a weld, had experienced gradual graphitization. That is, the iron carbide in the steel had precipitated its carbon out in the form of flakes, which greatly reduced the effective cross-section of solid metal, and both the strength and ductility of the original steel were lost, so that a brittle failure occurred under stresses that had been safe for the original steel. Such failures are difficult to foresee, but their occurrence points to the importance of knowing the nature of any metallurgical changes which may take place in metals in service.

References

[1] A. L. Brown, J. B. Smith, "Failure of Spherical Hydrogen Storage Tank," Welding Journal, March 1945.

[2] "Design and Methods of Construction of Welded Steel Merchant Vessels," Interim report of Special Board of Investigation, Welding Journal, September 1944.

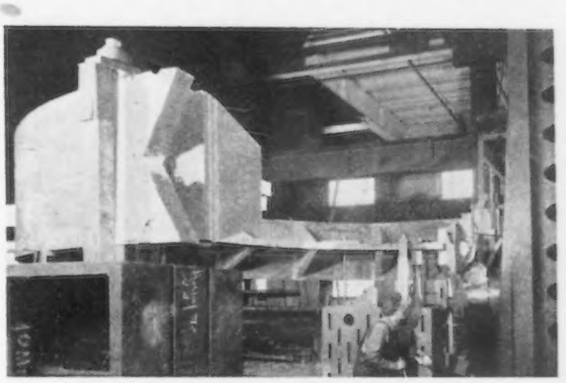
[3] G. A. Timmons, "Graphitization of Carbon-Molybdenum Steel in High Temperature Steam Piping," ASME Transactions, 1945.

[4] Metals Handbook, ASM, 1939, p. 676.

Large Herringbone Gear Fabricated by Welding

ALTHOUGH welded steel gears are by no means unusual, the unit fabricated recently by the Allis-Chalmers Mfg. Co. is out of the ordinary on account of its size. Measuring 15 ft 8 in. in diam with a 24-in. face, the blank had a weight of 22,000 lb before cutting the 284 herringbone teeth on a 1½ DP. It was fabricated in two sections consisting of a 4-in. thick rim, a heavy web, and numerous gusset plates as shown in fig. 1. Union of the two halves was effected by V joints and heavy welded brackets through which bolts were passed.

After fabrication each half was stress relieved and the V ends were rough machined on a horizontal mill as shown in fig. 2. Finish machining of the joints was performed on a planer as shown in fig. 3. The OD and edges of the rim were then turned and the web faced and finish bored to size on a large boring mill.

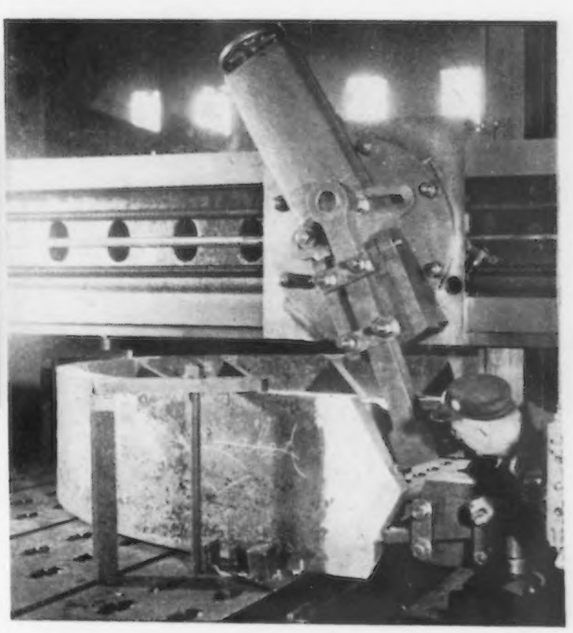


ABOVE

FIG. 2—By placing the gear on a horizontal bar, it was possible to take a roughing cut on the flat surface of the V joint, thereby relieving the labor on the planer.

ABOVE

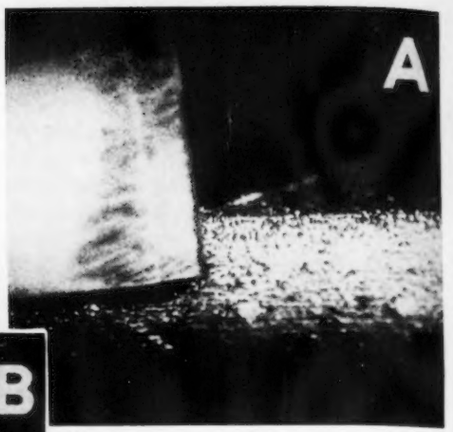
FIG. 1—After fabrication and stress relieving, each half of the gear blank is checked and marked up for machining on the layout table.

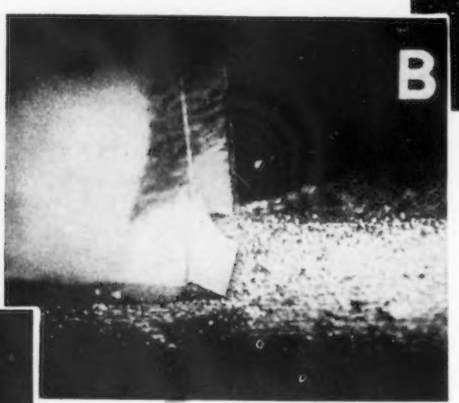


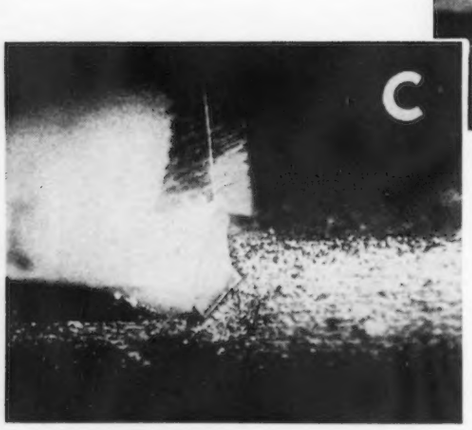
RIGHT

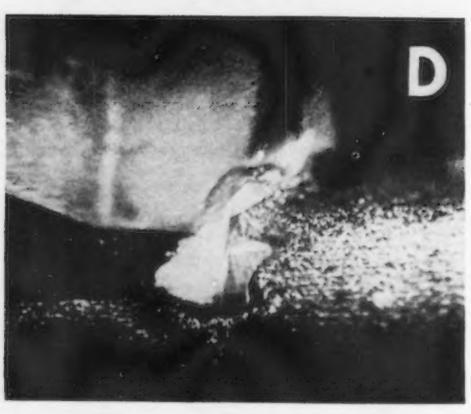
FIG. 3—Close-up of the finishing operation being performed on a planer to produce an exactly matching joint.

High-Speed Photos Show Cutting Tool Breaking









PICTURED in this remarkable series of high speed photographs is a record of what happens when a fly cutter on a milling machine is broken by overloading through increasing the rate of feed beyond that prescribed for the work. The cutter is tungsten carbide, and the workpiece cast iron. Depth of cut is 3/8 in., feed is 5 1/8 ipm, and the cutter speed 717 rpm.

In photo A the cutter has just contacted the work but has not yet started to cut, and at B fracture is well under way. A few thousandths of a second later the tool tip can be seen in C to have fractured completely and to be jammed between the work and the body of the cutter. At D the broken tip is being partially pulverized at the rear while the front portion is driven deeply into the workpiece, and at E the tool breaks free from the chip and continues rotation in a flurry of sparks and powdered fragments of metal.

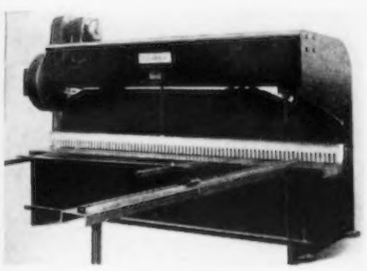
Taken with an Eastman Type III high speed camera operating at the rate of 3000 frames of 16 mm film per sec, the series represents a time lapse of approximately 0.07 sec from first to last, or about 200 frames of motion picture film. Viewed as a continuous motion picture, the breaking action is far more easily studied than in a series of stills since every phase of the rupture at intervals of 1/3000 sec becomes clearly visible when projected at the normal rate of 16 frames per sec, equivalent to slowing down the action 187 times.

New Equipment . . .

New models in squaring shears, openside planers, hydraulic bulldozers, contour grinders, and several machine tool attachments including bar feeds, cylindrical grinding and indexing units and a threading tool holder are described herein. Triple stage washers, a foundry sand moisture tester, infrared drying ovens and electrode tip dressers are also discussed.

Squaring Shears

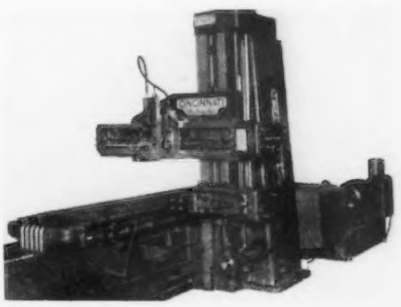
LONGER shear blades than are normally required for cutting full width material provide an opening on one end equal to the maximum thickness of material, thus eliminating tearing or nicking when notching or trimming sheets longer than the blades on squaring shears produced by the *Columbia Machinery & Engineering Corp.*, Hamilton, Ohio. No adjustment is necessary to change the manner of shearing. The upper blade holder has a heavy brace with provisions



for adjusting horizontal alignment of the upper blade. All principal members such as the housing, base, table slide, etc., are fabricated of rolled steel plate to provide high strength and maximum rigidity and accuracy. Standard throat depth is 18 in. and the shears are made in 3 sizes. The 6-ft size will shear ¼-in. mild steel at 60 strokes per min and the 10-ft and 12-ft models will shear 3/16-in. mild steel at the same speed. The shears are furnished with flywheels for belt drive but can be furnished with high-torque, high-slip or general purpose motors.

Openside Planer

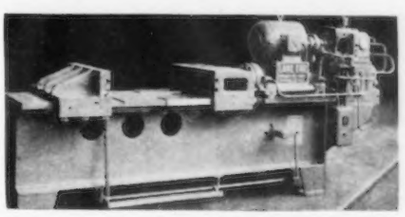
DEVELOPED for the small planer field and for small planer work in large production plants and said to be a completely new machine, the 30 in. x 8 ft Hypro hydraulic planer has been announced by the *Cincinnati Planer Co.*, Cincinnati 9. This planer has approximately 41 new and exclusive features it is reported. It is driven by a new type hydraulic unit with Hypro finger tip remote control for



infinite adjustment of table speeds. A new type of hydraulic feed mechanism and hydraulic tool lifters are other features.

Hydraulic Bulldozers

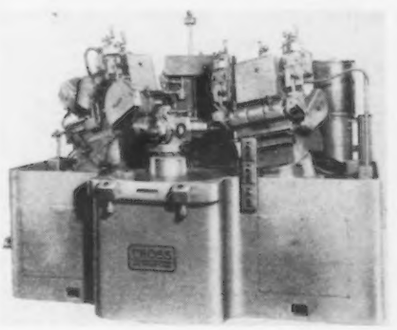
HYDRAULIC bulldozers available in a wide range of types and sizes for standard and special applications have been developed by *Lake Erie Engineering Corp.*, Buffalo 17. The bulldozers are self-contained units, foot-treadle operated. Pressure on the treadle



advances the crosshead. The stroke is stopped and returned at any point by releasing the treadle and approach and return of the crosshead is accomplished by auxiliary and double-acting traverse cylinders. Any part of the stroke can be used with full pressure at any point. Standard equipment includes adjustable stroke stops, automatic adjustable pressure control on pumps, air and oil filters, and pressure gages.

Special Grinding Machine

A SPECIAL machine tool for grinding teeth in spring clutches from the solid and simultaneously chamfering one side has been developed by *Cross Co.*, 3250 Bellevue Ave., Detroit. Production of 200 eight-tooth clutches per hour can be obtained by one opera-

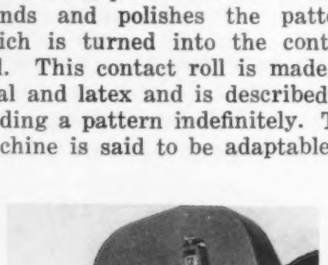


tor, it is claimed. A three-station turret power indexes the work pieces from station to station. The parts automatically index on their own axis at each station from one tooth to the next. When the work clamping lever is released, the work stops rotating, thus providing for quick, easy loading and unloading. The grinding wheels are automatically dressed while the turret indexes. The machine is completely universal within its range, with provision for various numbers of teeth as well as for a variety of tooth sizes and angles.

Contour Grinder

DESIGNED for grinding and polishing contours and maintaining a sharp, fully machined pattern, the type C-6 grinder manufactured by *Porter-Cable Machine Co.*, Syracuse, N. Y., features a flexible abrasive belt which approaches

and leaves a formed contact roll at a slight angle. The belt drapes itself into the pattern on the roll and grinds and polishes the pattern which is turned into the contact roll. This contact roll is made of sisal and latex and is described as holding a pattern indefinitely. The machine is said to be adaptable to



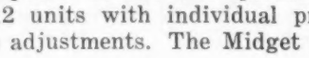
grinding with flat-face contact rolls from the hard rolls to soft buffs. Size is 26x38 in. and the machine accommodates a 148-in. abrasive belt. As the contact roll is an idler, heat, motor and shaft vibration are said to be avoided.

Bar Feed Attachment

A LIQUID-pressure bar feed attachment for single spindle automatic screw machines is now in production at *Hy-Level Screw Products Co.*, 2114 W. Superior Ave., Cleveland 13. The attachment is said to increase production by 15 pct. Other features are reduction of noise by 75 pct as the stock tube entirely encloses the stock, and elimination of whipping. It feeds out to 4½ in. per cycle of machine; no outside power is required as the attachment is driven off the coolant pump.

Small Press

THE Multipress Midget designed for pressing requirements between 200 and 2000-lb ram effort has the features of the larger Multipresses, according to the manufacturer, *Denison Engineering Co.*, Columbus 16, Ohio. The press is suited for multiple installations and for successive operation requirements. One centralized power source will operate up to 12 units with individual pressure adjustments. The Midget can



be operated in any position and is said to be adaptable to other hydraulic machinery as an accessory unit for pressing, clamping, feeding and other production work. Optional equipment includes three base plate designs, nonrotating ram guides, interchangeable valves for manual or vibratory action, adjustable daylight and throat depth clearances, and a choice of three pumping stations for operation in series of 4, 8, or 12 units.

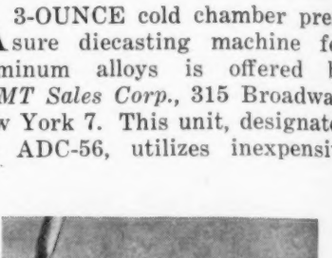
Grinding Attachment

TO ADAPT surface grinders for the dry grinding of small cylindrical work and work requiring indexing, a cylindrical grinding and indexing attachment has been announced by the *Brown & Sharpe Mfg. Co.*, Providence 1. Straight cylindrical and tapered work is

ground between centers, or if ½ in. diam or less, it can be held in the indexing spring chuck. Spring collets for the chuck accommodate round work of diameters from ⅛ to ½ in. The motor is completely enclosed and the ball bearings in the index head and spring chuck are permanently lubricated and sealed. The attachment centers swing 6 in. diam and take work 5¼ in. in length. Maximum grinding angle is 45°.

Aluminum Diecasting Machine

A 3-OUNCE cold chamber pressure diecasting machine for aluminum alloys is offered by *DCMT Sales Corp.*, 315 Broadway, New York 7. This unit, designated the ADC-56, utilizes inexpensive



single cavity molds and injects metal under high pressure with a pneumatically operated metal injection plunger.

Carbide Cutters

AVAILABLE in six sizes, vertical ejector type cutting tools introduced by *Superior Tool Co.*, 21650 Hoover Road, Detroit 13, feature vertically held ⅜-in. sq solid carbide inserts. By rotating the carbide insert and then inverting it a total of eight cutting edges, four on each end, may be used before resharpening. Depth of cut with the ⅜-in. sq inserts which are standard for all holders is said to be only slightly under ⅜ in. In addition to finishing operations the tool has been designed for use in facing cuts and for turning to a shoulder. Horsepower requirements are said to be the same as for standard single point turning tools and considerably less than required for round carbide inserts.

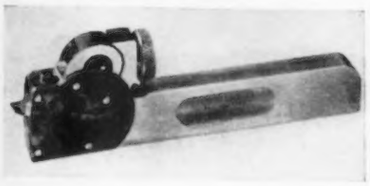
Matched Tool Steels

TO give tool and die makers greater simplification in the selection, heat treatment and use of tool steels, a new and improved set of matched tool steels has been

developed by the *Carpenter Steel Co.*, 321 W. Bern St., Reading, Pa. Three Air-Hardening tool steels have been added to the matched set. Where extreme wear resistance and good toughness are needed, No. 610, Air-Wear, is recommended. For jobs where combination of wear resistance and toughness is essential, tool makers can use No. 484 Air-Hard. Vega, Air-Tough, is used for tools that require extreme toughness with good wear resistance. Two new members have been placed in the Red-Hard matched set: T-K combining greater hardness with improved toughness and No. 8883, Red-Tough offering extreme toughness and greater red hardness. The 12 steels that make up the complete Carpenter matched set are so interrelated that each takes up the work where the other leaves off.

Threading Tool Holder

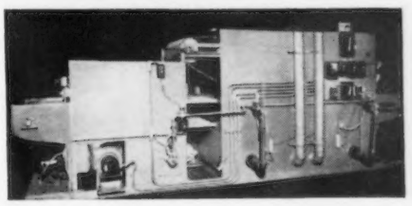
ELIMINATION of the gooseneck in a threading tool and the employment of a new principle in tool construction are claims made for the Ideal threading tool holder announced by *Guarantee Tool Co., Inc.*, 96 Maple St., West Orange, N. J. This threading tool holder, made to hold a single point cutting tool, is so constructed that the cutting tool retracts in a horizontal plane away from the work when pressure is too great for efficient cutting, thus preventing breakage



of the tool point or damage to the work piece. Because of this horizontal movement of the tool holder element, it is claimed that less clearance is required at the cutting point of the tool, providing greater support to the cutting surface. Time required to cut a thread in a lathe is said to be reduced by more than 40 pct. An adjustment permits increasing or decreasing the horizontal pressure while the tool is cutting.

Triple Stage Washer

FOR the processing of light, small, cup-shaped stampings of comparatively uniform depth, a triple stage washing machine has been developed by the *Mabor Co.*, Rahway, N. J. The cycles of the equipment include a washing stage,



rinsing stage and a section for drying parts. The hold-down conveyor can be adjusted to accommodate various types of parts. The machine illustrated is gas heated by means of immersion combustion burners, although any heating method can be utilized. Any one of the three processing stages can be eliminated or additional processing stages may be added. Pumps are close-coupled, and the air heat device is direct fired. The unit is equipped with automatic safety devices for gas burners and temperature controls.

Welding Electrodes

DESIGNATED Hobart No. 13, an electrode designed to simplify the welding of light gage mild steel has been introduced by *Hobart Bros. Co.*, Troy, Ohio. Low penetration, ease of handling and steady uniform transfer of metal are characteristics said to make this electrode suited for out-of-position welding on light-gage sheet metal. It is also recommended for welding light sections of mild steel to heavier ones. This electrode is designed for use with dc straight polarity or ac, and is available in 1/16, 5/64, 3/32 and ⅛ in. diam.

Electrode Tip Dresser

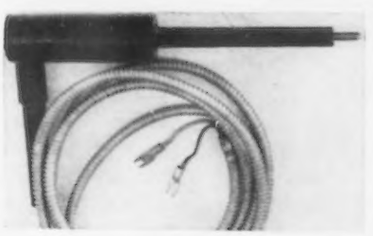
INTRODUCTION of an electrode tip dresser to the resistance welding field for precision dressing of worn electrode points, has been made by *C. O. Porter Machinery Co.*, 666 Front Ave. N.W., Grand Rapids, Mich. The tool is adaptable to portable guns, short stroke stationary welders and multiple point welders. The main feature is the floating cutter blade made of Tan-Tung steel. The blade floats in the chuck body giving uniform cutting action on both edges and correct centering of the electrode as the tip is reshaped, it is said. Worn electrodes may be dressed without removal from the welder.

Moisture Tester

KNOWN as the Moistmeter, an instrument for quickly and accurately determining the moisture content of foundry sands has been developed by the *Harry W. Dietert Co.*, 9330 Roselawn Ave., Detroit 4. It is a practical moisture tester which is pushed into the sand pile, sand bin, or into the sand contained in a sample can as small as a quart. The sand sample under test is held within a curved sampling plate and compressed to a definite degree by means of a spring loaded arm. The sand slides through the sample cup and wipes the electrodes as the Moistmeter is pushed into the sand pile. Thus a moisture test may be made at any depth up to 30 in. from the surface of the sand pits. The instrument is equipped with a dial thermometer to measure the temperature of the sand being tested.

Two-Point Thermocouple

SAID to give instantaneous temperature of nonferrous alloy billets at the time of forging or extruding, a two-point thermocouple has been developed by the

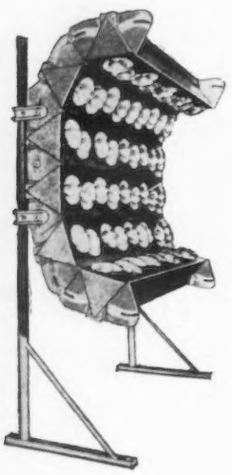


Industrial Instrument Service Co., Huntington Park, Calif. It is especially adaptable to work in conjunction with high speed potentiometers though it may be used with millivolt type pyrometers, it is said. It can be used on the same controller operating the billet heating oven by connecting into the control couple wiring with simple foolproof circuit. Renewable points can be

supplied or made from standardized thermocouples. Made to order of any base metal thermocouple wire, the device can be supplied in lengths of 4 in. to 10 ft.

Infrared Drying Oven

DESIGNED around the company's "minimum oven air content" principle, an infrared oven redesigned by the *Wil-Son Mfg. Corp.*, 154 W. Erie St., Chicago,



offers completely enclosed and insulated sections, assures top efficiency and heat control, it is said, through combined radiation and convection heating. The higher efficiency features are incorporated in the Patent-Flex tunnel sections which offer flexibility as to size and shape of the oven, as well as 3-min adjustment for adoption to different products. Standard units are available in small sections utilizing as few as 4 lamps up to large sections such as for the automotive industry.

Steel Factory Sash

DESIGNED for greater strength and weather-tightness in industrial buildings having large glazed wall areas, the Lok'd Bar steel factory sash manufactured by *Hope's Windows, Inc.*, Hopkins Ave., Jamestown, N. Y., is Bonderized and finished with baked-on rust inhibiting primer for longer life under conditions of corrosion and exposure. Vertical sash bars are bulb T sections approaching the I-beam type of section in strength. In the Lok'd Bar Joint, the flat T horizontal muntin is threaded through the bulb T, both with the least distortion of the metal and the least detraction from solid bar strength, it is claimed. The weight of the section is heavier and the strength of the joint is said to be double that of conventional sash. Ventilators are complete casement and frame units welded at the corners and reinforce the sash where they occur.

Slewing Boom Attachment

AN INTERCHANGEABLE motorized slewing boom attachment for automatic fork trucks has been introduced by *Automatic Transportation Co.*, 149 W. 87th St., Chicago 20. With a capacity up to 1820 lb, a maximum height of 18 ft 5 in., and a horizontal arc of 120°, the unit is designed to

perform all the usual operations in heavy-metal and similar industries requiring crane-type handling equipment. Quickly detachable, the boom may be replaced by standard forks, gooseneck crane, motorized fork carriage, ram or other attachments for standard or specialized handling operations. The boom is manually adjustable in outreach from 54¼ to 108¼ in.; it is vertically adjustable from horizontal to an upward angle of 30°; and it swings horizontally 60° to either side of center. It is rated at 1100-lb loads at maximum outreach and 1820 lb when in the closed position. Maximum height of the hook is 18 ft 5 in.

Silver Powder

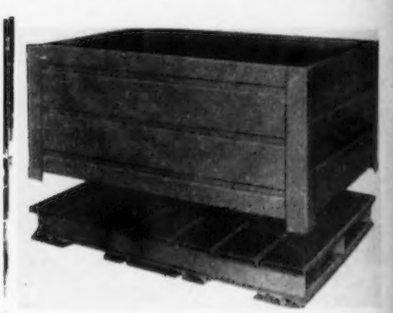
TYPE MR 3 fine silver powder which is chemically precipitated, white in color, free flowing and of 99.97+ pct purity, has been announced by *Alloymet Mfg. Corp.*, 3 Grand St. Ext., Brooklyn 11. The powder is further described as containing no free acids or alkalies and unusually gas free. Particle size distribution is from −200 to +400 mesh. Grains are in a fully annealed condition and the particles are said to be irregular in shape which produces an interlocking effect when pressed, giving compacts a high green strength. The lack of micron size particles is claimed to minimize the loss of powder through dusting during pressing operations. The powder is said to possess a high density causing it to flow readily into odd shaped dies.

Gloves and Gauntlets

ADDITION of four styles of oil-resistant rubber canvas gloves and gauntlets to its line is announced by the *B. F. Goodrich Co.*, Akron, Ohio. The styles include men's and women's knit wrist gloves, men's 14½-in. gauntlets and men's ventilated knit wrist gloves. These products are larger than the conventional types in the same sizes, semi-curved for knuckle freedom and hand dexterity and made with a reinforced thumb crotch.

Corrugated Metal Pallets

ALL-METAL pallets with nesting rings, for use with power or hand trucks, have been announced by *Palmer-Shile Co.*, 16005 Fullerton Ave., Detroit 27. Pallets are of special corrugated rolled

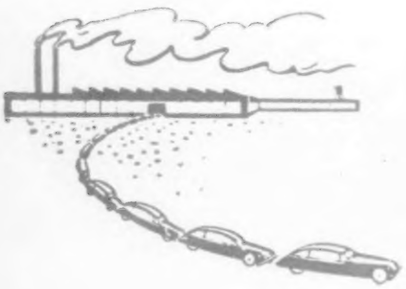


steel, with all-welded construction, are built with beveled edges to allow hand truck wheels to ride over easily, and have a center channel support. Finish is air-dry enamel. The pallets are of various types and sizes, including a single-face pallet rack with stacking corners for handling irregular pieces, and a double-faced, two-way pallet for power fork-truck only. They are available with rings permanently welded to the pallet, if desired.

Assembly Line . . .

WALTER G. PATTON

• GM announces a price increase of 2 to 6 pct . . . Work stoppage at Ford held likely . . . Hudson automatic transmission is vacuum operated.



DETROIT—One of the unanswered questions here is whether or not the recent General Motors price increase of 2 to 6 pct across the board will set off a series of price changes by other producers. Some independents whose prices have been comparatively higher than GM prices will be strongly tempted to hold prices at existing levels since this would undoubtedly help their competitive position.

However, the explanation given by GM for increasing its prices would indicate that holding the price line will not be easy. In making its new price announcement GM pointed out that since November 1946 labor costs have risen 12 pct and pig iron prices have jumped 29 pct. During the same period, copper increased 26 pct; coal 22 pct; tin 22 pct; lead 43 pct; cotton 23 pct and wool 12 pct. In the face of these increases it is difficult to see how independent producers are going to be able to hold the price line no matter how much they may wish to do so.

There was one consolation for new car buyers who are waiting delivery on a new car—you could still buy a car from a new car dealer much cheaper than you could buy just as new a car from a *used* car dealer!

No one here is minimizing the possibility of a strike at Ford. When Henry Ford II failed in his attempt to get Phillip Murray of UAW-CIO to intervene, the company was undoubtedly near the end of its trump cards.

The Ford formula offered the union a compromise that in the opinion of many observers here was reasonable and might have been acceptable if the union had not already built up so much steam behind its present drive to inject "no-penalty" clauses into its contracts.

The UAW-CIO position is that the union cannot be held responsible for "irresponsible factions" in the union, although the Ford formula seemed to indicate that proof that the union has acted in good faith would be sufficient to avoid a penalty where such strikes occurred.

At the same time, negotiations between Ford and the union over the proposed pension have struck snags that are just as serious as the "no-penalty" impasse. In an effort to justify its present position, Ford released to the public for the first time the full details of the company's offer. It has been widely held here that the opposition to the pension is Communist inspired.

UP TO the present time there have been two fundamental approaches to the problem of providing automatic driving for passenger cars. The first approach is to provide a device that will operate entirely automatically under all conceivable driving conditions in response to the accelerator.

The Oldsmobile Hydra-Matic, the torque converter (which is used in a number of buses) and the Chrysler fluid drive with hydraulic transmission provide such a mechanism. Each of these devices is hydraulically operated.

The second approach to the automatic transmission problem is exemplified by the Hudson Drive-Master in which the present clutch and gear shifting mechanism is supplemented so as to provide automatic clutch operation, automatic gear shifting or conventional driving—all three in combination or individually—as desired by the driver. Regardless of the driving method used, the gears may be shifted at anytime. Hydraulic operation is not involved in the Hudson Drive-Master.

Although the Hudson Drive-Master was first introduced in 1941 it has been given comparatively little publicity. World War II came along shortly after its introduction. However, more than 30,000 Drive-Master units are now in the hands of Hudson owners and the demand is constantly increasing according to Hudson's sales department. Hudson estimates that more than a billion miles have been driven by owners who have purchased the Drive-Master unit as optional equipment.

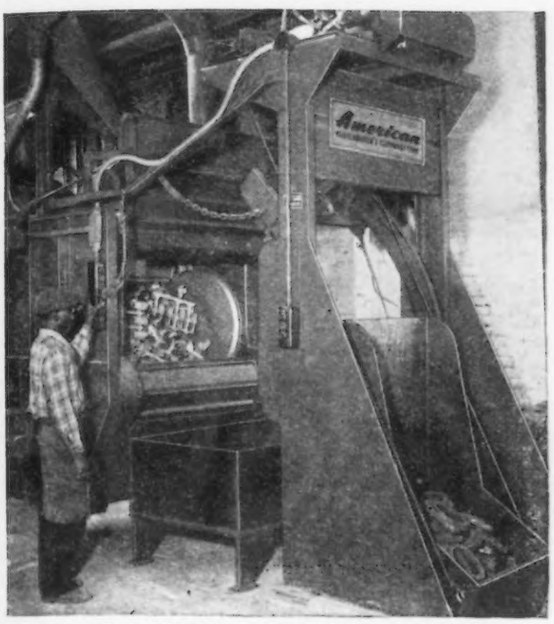
Hudson's Drive-Master consists of two special units, one of which is mounted under the hood where it is easily accessible. Power required to operate a vacuum cylinder is provided by the engine; the controls are operated through solenoids that respond to the accelerator pedal. A second vacuum unit mounted on the transmission case provides the power required for shifting gears. Control is again provided by solenoids. The transmission is of the synchronized silent mesh type incorporating a synchronizing unit which prevents gear clashing.

As Hudson engineers explain it: "Drive-Master is designed to meet anybody's likes and dislikes. It permits three distinct methods of driving. There is nothing new for the driver to learn. The driver has all of the controls provided in his present car."

With Hudson's Drive-Master the motorist can do all normal driving without gear shifting or clutching. If, at any time, the driver wants to shift gears without using the clutch, it is only necessary to push a button on the instrument panel which puts the car in Vacumotive Drive. By pressing another button conventional gear shifting and clutch operation is possible.

To start a car equipped with the Drive-Master unit it is first necessary to place the gear shift lever in the high gear position. Depressing the accelerator pedal causes the car to move forward in the "Pick-Up" gear—approximately the equivalent of second gear. The car remains in

AIRLESS WHEELABRATOR cleans railway specialties in fraction of former time



This 36" x 42" Wheelabrator Tumblast cleaned a quantity of steel locomotive castings in 57 minutes that formerly required 19 hours by airblasting at the Balmar Corp., Baltimore.

The speed cleaning of the airless Wheelabrator is playing a vital role in helping to solve the present critical railway car shortage. Its faster more thorough cleaning of all sizes and shapes of castings saves many hours daily in the production of these much needed parts.

for example

• At the General Railway Switch Co., Rochester, N. Y., a 36" x 42" Wheelabrator Tumblast is cleaning the same amount of work in sixteen hours that formerly took 24 hours on 2 airblast tables. This work includes steel castings, cable pulleys, signal mounts, etc.

• 1500 pound loads of annealed castings are being cleaned in from 10 to 12 minutes by a 48" x 72" Wheelabrator Tumblast installed in the Harrison Foundry, Attica, Indiana. Here, the Wheelabrator is cleaning work in 8 hours that took 24 hours to clean by the previous method.

• A Wheelabrator Tumblast, installed at the Canadian Bronze Co., Ltd., Montreal, Canada cleans seventy-five 5" x 9" journal bearings, weighing 18 lbs. each, in 4 minutes. Former methods took 30 minutes to clean the same amount of work.

TYPICAL USERS

New York Air Brake Co.
Pratt & Letchworth Co.
American Steel Castings Co.
American Locomotive Co.
Unitcast Corp.
American Brake Shoe Co.
The Griffin Wheel Co.
Pullman Standard Car Mfg. Co.
Canadian Car & Foundry Co., Ltd.
Locomotive Finished Material Co.
American Car & Foundry Co.
Magnus Metal Division
Timken Roller Bearing Co.
The Baldwin Locomotive Works
Union Switch & Signal Co.
Westinghouse Air Brake Co.
General Railway Switch Co.
Norfolk & Western Railway Co.
Electric Steel Castings Co.
Falk Corp.

American
WHEELABRATOR & EQUIPMENT CORP.
(FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.)
510 S. Byrkit St., Mishawaka 3, Indiana

World's Largest Builders of Airless Blast Equipment

this gear as long as the accelerator is depressed. By releasing the pressure on the accelerator the car shifts automatically into high gear. When coming to a stop the car is shifted automatically back to "Pick Up" gear and is ready for a new start.

In common with other manufacturers who have brought out automatic-type transmissions, Hudson has had to face some service problems. The usual resistance of garage mechanics and auto service men to something 'new' was encountered when Drive-Master was first introduced. Many good mechanics went into war service and this made the problem of Drive-Master service more difficult.

SINCE the resumption of automobile production, Hudson's service department has concentrated on this problem and now feels that service in the field of the Drive-Master unit is no longer a problem. During the past several months service schools have been held in 120 large U. S. cities to which Hudson dealers have been invited for 2-day sessions. A chassis equipped with a Drive-Master unit was provided at these service demonstrations. The Hudson service department had previously developed a "Check Chart" which lists eight different checks that must be made in a specified order to determine where operating trouble has developed.

Using these simplified service charts the trouble can be quickly located. Wherever necessary, defective parts can be replaced quickly. It is not necessary, Hudson says, to replace entire Drive-Master units. Complete checks to locate trouble can be made in about an hour and a half according to the service men. Reports from the field indicate it is an exceptional case where more than 3 hr are necessary to put the car back on the road.

Practically all Hudson dealers are now provided with the subassemblies necessary to provide complete service on the Drive-Master unit.

Hudson also provides as optional equipment a transmission overdrive. This unit which is also factory-installed provides for fourth speed operation at approximately 22 mph and permits free wheeling on deceleration below 19 mph. Hudson engineers estimate that engine speed is reduced 28 pct in relation to car speed by the use of overdrive, thus providing both smoother operation, low engine maintenance cost and from 2 to 5 additional miles per gal in cross-country driving.

Overdrive is cut-in by pushing a control knob located under the instrument panel and the shift to overdrive is accomplished automatically by releasing the accelerator momentarily. The car will then remain in overdrive until speed is reduced to 19 mph, the which time the overdrive automatically disengages.

To permit fast acceleration in passing cars or in ascending steep grades, the accelerator is pressed very rapidly to the floor. As this action takes place, the ignition is interrupted momentarily, releasing the overdrive and permitting the engine to pick up the load in direct drive. To re-engage the overdrive, the accelerator pedal is momentarily released after which normal driving is resumed.

THE flexibility of the Hudson Drive-Master package according to the motorist's purse, personal preference or driving needs is believed to be unique among the automatic transmission units offered to the public today. Thus, a motorist who wishes to do so may purchase the Vacumotive Drive only; or he may select Drive-Master only which includes the vacuum - operated clutch. Or the customer may buy the overdrive unit in combination with the Drive-Master or the overdrive only. The Drive-Master unit is priced today at $96 f.o.b. factory.

According to Hudson engineers, in addition to an efficient transmission that provides quick starting and driver control at all times, the possibility of creeping in traffic is entirely eliminated. Service needs can be readily met. In addition to its service schools, design changes in the electrical controls have been made recently at the factory that make it impossible for a mechanic to make an improper electrical connection.

With so much attention being given to automatic transmission by the auto industry it will be interesting to see whether some new type hydraulically - operated transmission or a conventional transmission supplemented to provide automatic operation if desired is going to win out. Hudson engineers who have been working steadily on the problem since 1935 are convinced that their present transmission—plus a number of improvements still in the experimental stage—will provide plenty of competition for the rest of the industry.

OLDTIMERS ON PARADE: *Celebrating the 40th anniversary of the Glidden Tour, owners of old cars will participate in the 1947 reenactment of this famous event in September. Pictured here at Portsmouth, N. H., is a Stevens-Duryea with acetylene gas lights which will do 45 mph without straining. The tires are a modern production of an early non-skid design. This car cost $3000 new.*

Armco Buys Foundry

Washington

• • • **American Rolling Mill Co.**, has purchased from WAA the government-owned steel foundry facilities built for its Middletown, Ohio, plant during the war for $125,000. The facilities include the foundry, office and pyrometer buildings, annealing furnace, core oven and other equipment. Original cost to the government was $402,000.

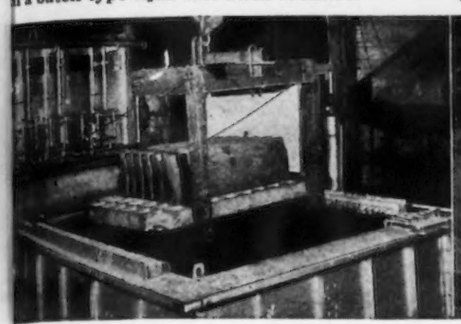
THE FIGURES PROVE IT! *The Trend is to-*

AJAX HULTGREN ELECTRIC SALT BATH FURNACES *for all heat treating operations*

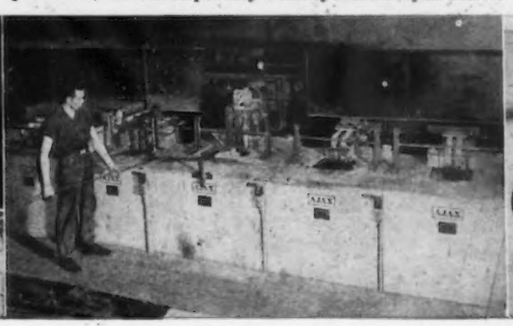
CARBURIZING automobile steering gear parts in a batch type Ajax salt bath furnace.

AUSTEMPERING automobile bumpers (3000 lbs. per hour) in a completely conveyorized Ajax unit.

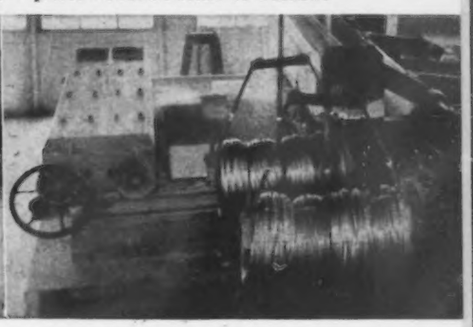
NEUTRAL HARDENING carbon and alloy ste parts without scale or decarb.



CYCLIC ANNEALING 9-ton charge of crusher jaw plates in Ajax salt bath quench furnace.



HARDENING HIGH SPEED STEEL tools of all analyses.



PROCESS ANNEALING 750 lb. charge of stai less steel wire in 20 minutes at 1900° F.

WELL OVER 2,500 units installed in the first 10 years . . . that's the phenomenal record established by the AJAX-Hultgren electric salt bath furnace . . . a record unparalleled in the industrial furnace industry! The millions of dollars invested are an incontestable endorsement of the unique AJAX closely-spaced, immersed electrode principle. This patented *internal* heating method is applicable to any heat treating operation from 350° to 2400° F.—with the following advantages:

UNIFORM TEMPERATURE—less than 5° variation . . . no local overheating . . . minimum distortion of work.

LONG POT LIFE—measured in years instead of in weeks.

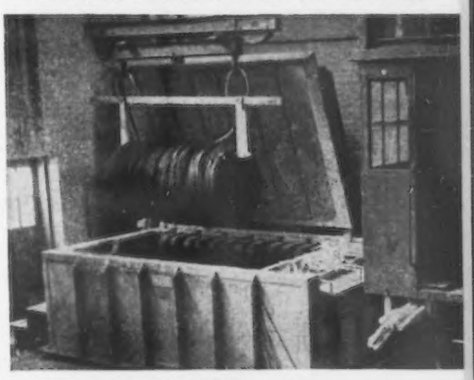
ATMOSPHERE CONTROL—salt bath seals out all air . . . prevents scaling and decarburization.

RAPID HEATING—4 to 6 times faster than radiant or air-convection type furnaces . . . size and cost of equipment proportionately less.

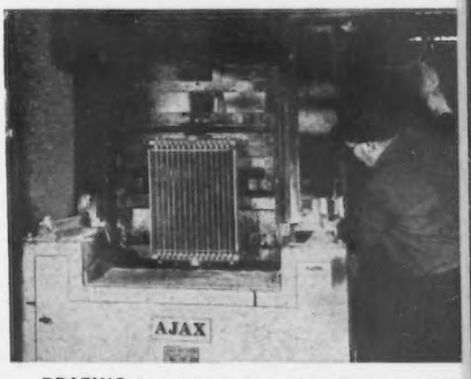
SPACE ECONOMY—requires about ⅓ the floor space of most other types.

READILY MECHANIZED—for low-cost mass production with minimum labor.

Submit specimens of your work for treatment in the new Ajax Metallurgical Service Laboratory. Get positive proof that AJAX furnaces can produce the results you seek before investing a cent in any equipment!



CLEANING AND DESCALING stainless steel r by the duPont Sodium Hydride Process.



BRAZING 44 copper tubes to radiator manif simultaneously. Time: two minutes.

AJAX ELECTRIC COMPANY, INC.
Frankford Ave. at Delaware Ave., Philadelphia 23, Pa.

The World's Largest Manufacturer of Electric Heat Treating Furnaces Exclusively!

Associate Companies: Ajax Metal Co. • Ajax Electric Furnace Corp. • Ajax Engineering Corp. • Ajax Electrothermic Corp.

In Canada: Canadian General Electric Co., Ltd., Toronto, Ont.

If you want to learn more about salt bath heat treating, write on your firm's letterhead for our NEW 72-PAGE BOOKLET

AJAX HULTGREN ELECTRIC SALT BATH FURNACES

Washington . . .

EUGENE J. HARDY

• Geneva steel sale dragged out by politics . . . Briefs coming in on U. S. Steel antitrust case . . . German level of industry perplexes State Dept. economists . . . White-collar exemptions slated for change.

WASHINGTON — Recent attempts to drag U. S. Steel's purchase of the war-built Geneva steel mill back into the Washington arena can be dismissed as just so much politics. After failing to push through Congress a resolution calling for an investigation of Attorney General Tom Clark's part in the Kansas City vote irregularities, certain legislators tried to embarrass Mr. Clark from another angle — namely, the mysterious suppressed report of the Antitrust Div. which supposedly stated that the sale of Geneva to U. S. Steel would constitute a monopoly.

Wendell Berge, former head of the Antitrust Div., made no secret of his opposition to U. S. Steel's acquisition of the plant, but, as pointed out by justice officials, it is not uncommon for differences of opinion to arise within government departments. In this instance, Mr. Berge was overruled by the attorney general who stated that the Geneva purchase "unequivocally" was not a violation of the antitrust laws.

Actually, there was also considerable difference of opinion within the corporation as to the advisability of taking over Geneva. This was partially revealed at the recent trial in the U. S. district court at Wilmington, Del., in which the Justice Dept. is seeking a permanent injunction to prevent the sale of Consolidated Steel Corp. to U. S. Steel for about $8.25 million. B. H. Lawrence, engineering vice-president of U. S. Steel, told the court that after several studies of the Geneva plant he recommended that U. S. Steel refrain from making the purchase.

Justice officials also point out that the department's action in the Consolidated case indicates clearly that the department will step into any situation where there appears to be a violation of the antitrust statutes no matter who is involved, including U. S. Steel.

WHILE the trial before Judge Richard S. Rodney at Wilmington was wound up on June 20, final determination is still some weeks off since all briefs have not yet been filed. The government's brief was filed July 22, and U. S. Steel has been given until Aug. 13 to reply to this brief. The government's reply to the corporation's reply must be filed by Aug. 28.

U. S. Steel's position is that their only motive in purchasing the Pacific Coast steel fabricating facilities of Consolidated is to provide an adequate backlog for the successful operation of Geneva Steel, purchase of which had been urged on the corporation by the government. Corporation officials also maintain that if Geneva is to be successfully operated it will be necessary to enter the structural fabricating field in the 11-state western marketing area. Studies made by the corporation revealed that it would have taken 2 to 3 years to construct new fabricating facilities, consequently, when Consolidated approached U. S. Steel and offered to sell its physical assets the offer was snapped up.

The corporation denies the charges that the Consolidated purchase would create a regional monopoly and declares that competition in the 11 western states would be strengthened by the merger, since, according to U. S. Steel testimony, Bethlehem Steel is now the largest fabricator in the area. Corporation attorneys state that U. S. Steel planned to go into competition in the fabricating business with Bethlehem long before government efforts to interest the corporation in Geneva were successful.

THE government contends that the purchase of Consolidated would result in a regional monopoly in the structural fabricating and heavy pipe fields. Specifically, the Justice Dept.'s brief makes the following contentions: (1) The proposed purchase would give U. S. Steel direct control over its principal West Coast customer for shapes and plates rolled at the Geneva mill; (2) it would afford U. S. Steel a dominant position in the structural steel and pipe market by eliminating the competition from the principal independent fabricator of these products in the area, and, (3) such control by U. S. Steel would tend to exclude competing fabricators from rolled steel now in short supply at a time of high demand and tend to exclude competing producers of rolled steel from an adequate fabricating market at times of low demand.

In attempting to obtain a permanent injunction against consummation of the sale agreement, Justice charges that completion of the purchase proposal would result in violation of Sections 1 and 2 of the Sherman Antitrust Act.

The brief also states that the "federal taxpayers, having subsidized U. S. Steel's operation of Geneva by absorbing 80 pct of its cost, were sadly mistaken in assuming that U. S. Steel would sell Geneva's shapes and plates to all consumers on a competitive basis."

* * *

EVER since American policy was changed to advocate an increase in the present level of German industry, State Dept. economic aides have been running around in circles. While there is agreement with the British and French on principle, details are causing many headaches.

American efforts in this direction have two principal aims: (1) to link the German industrial potential with the Marshall plan for

FOR INSTALLATION in small space

RUTHMAN GUSHER COOLANT PUMP ON A KENT-OWENS 2-20 Hydraulic Milling Machine . . . .

Here is a graphic illustration of the small space required for the installation of a Ruthman Gusher Coolant Pump. This P-3 1/10 Short Ruthman Gusher Pump requires no outside piping other than the hose and nozzle leading to the cutter. Both intake and delivery passages are self contained. Full freedom of movement is assured for the operation of the metal working machine.

Designed to utilize minimum space of metal working machinery, Ruthman Gusher Coolant Pumps can be mounted wherever they will not interfere with efficient operation.

They are manufactured in a variety of types and sizes, outside pipe connected, immersed, flange mounted with internal discharge, flange mounted with external discharge with motor capacity from 1/10 to 2 HP.

So whatever your needs in coolant equipment, you can be sure that there is a Ruthman Gusher Coolant Pump which will specifically fit your coolant pump requirements.

Write for Catalog 10-B

THE RUTHMAN MACHINERY CO.

1821 READING ROAD CINCINNATI, OHIO

European rehabilitation and (2) to take the load of German occupation costs off the backs of American taxpayers as quickly as possible.

Of course, any raising of the German level of industry at the present time is purely theoretical since due primarily to the lack of coal, which in turn is due to extreme food shortages, the present levels are still far from attainment. For example, the most optimistic observers say that German steel output for 1947 will probably be not more than one-half of the permitted 5.8 million tons.

While both Britain and the United States agree on the necessity for an eventual raising of the level of German industry, there is considerable disagreement over the methods to be employed. Some British statesmen are very much in favor of socializing German industry while the American hope is that Germany will develop its industry along democratic or free enterprise lines.

However, this is not the most important stumbling block in the diplomatic realm. The French fear of a revival of German industry is the major fly in the ointment. The French have vehemently opposed any plan to lift the German ceiling of steel capacity to 10 or 12 million tons. In fact, they have opposed any relaxation whatsoever.

IT IS reported, however, that French Ambassador Henri Bonnet has told State Dept. officials that his country might assent to raising the level of German industry if the output of Ruhr coal could be increased and a larger share turned over to France. This is where the situation takes on a merry-go-round aspect. If more coal is to be produced in Germany, more food must also be had. Any increase in food would of necessity come from the United States. Should coal production be increased some of this production would necessarily go to German industry so that German exports could lend a helping hand to the Marshall plan. The question then remains—what about the French?

But even the coal problem is far from solution. British insistence on injection of other problems in the Anglo-American talks scheduled for a few weeks ago resulted in an initial postponement of these discussions. Nevertheless, the American aim is to get German coal production up to 40 pct of capacity by the end of the year. Such an increase would be expected to raise German industry output which is now about 38 pct of prewar in contrast to France and the low countries where prewar rates have almost been established, according to Commerce Secretary Averell Harriman, who recently returned from Europe. Mr. Harriman has also stated that German industry will be helped materially by 300,000 tons of American coal now available for export.

A major concern of the British is to shift some of their share of the occupation costs of the joint Anglo-American zone to the United States. They are likely to be successful which will mean an end to the present 50-50 arrangement, with the United States assuming 70 to 80 pct of the cost.

* * *

DURING the early fall months the Wages and Hours Administration is expected to hold public hearings on suggested changes in the regulations covering "white collar" employee exemptions. Organized labor is exerting strong pressure to have present exemptions raised.

In the executive class any employee making a minimum of $30 a week is exempt and not entitled to the protection of the overtime provisions of the Wages and Hour Law. In the professional and administrative classification this exemption is a minimum salary of $200 a month. The regulations also provide that employees in these classifications must not devote more than 20 pct of their work week to nonexempt activities.

Any substantial increase in these exemption levels would mean increased overtime costs to thousands of employers and would probably work a definite hardship on small plant owners. However, it is realized that present exemptions are too low, since existing salary scales are higher in most sections of the country. The big problem appears to be the determination of a salary exemption satisfactory to both labor and management. An alternative would be to find a new method of determining the exempt status of an employee.

At a recent meeting of a labor-management advisory committee, the Wages and Hours Administrator, William R. McComb, stated that he believes that the salary test is now meaningless in view of overall salary increase.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

Quick-change Artist

There are many design and construction features that make the Bryant No. 112 precision internal grinder a *"Quick Change Artist"*—make it easy to set up or change over to suit a wide range of jobs.

Quickly adjusted cycle controls for wheelslide—Selection of cycle phases either manually or automatically through main wheelslide control. Independent setting of wheelslide traverse for wheel dressing and grinding by two convenient hand throttles. Universal stop rod positions wheelslide for face grinding. Positive locking reversing dogs for setting grinding stroke quickly. Belt driven wheelheads; Hi-Frequency wheelheads for speeds up to 100,000 R. P. M.

Work spindle designed for operating efficiency—Rigid setting for taper grinding up to 90° included angle, provided by double circular slide mounting. Infinite spindle speeds from 100 to 1000 R.P.M. Quick interchange of chucks, holding fixtures and face plates provided by American Standard Type Cam Lock Spindle Nose.

Three cross feed controls for versatility—Fast set-up provided by rapid traverse cross feed. Increased output on long runs with power cross feed control. Accurate size control through precision feed dial.

These are the highlights that make set-up of the 112 simple and change-over fast. When combined with the basic features available in all Bryant grinders, they add up to less down time, more accurate work, finer work finish and faster production. If you are interested in a *"Quick Change Artist"*, write today for the No. 112 catalog.

Another BRYANT Postwar Development

Send for the Man from

BRYANT CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U. S. A.

BRYANT

West Coast . . .

ROBERT T. REINHARDT

• Rising steel prices inviting competition from aluminum and plastics although ingot capacity is on increase . . . Tricycle automobile makes debut in Los Angeles.

SAN FRANCISCO — Thinking back to last April when there were rumors that steel prices might be cut—and a few minor reductions were actually made—many a manufacturer using steel tried hard last week to reorganize his thinking and his own prices as he studied the increases announced by producers.

West Coast steel buyers of course had plenty of company, but this was of small comfort as they contemplated what is likely to happen when they attempt to pass along the increase to their customers who, in some instances, are already showing some resistance to prices.

Western producers who last week followed the national trend and raised steel prices $3.00 to $6.00 per ton, offered the same reasons: "To meet higher production and material costs." As one buyer asserted, "printers could save a lot of money by leaving that line of type standing in their shops for frequent re-use." On the whole, however, steel buyers locally haven't expressed too much resentment of the increases as they have had ample time to get accustomed to the idea and more or less expected them after the coal wage settlement.

One observable effect of the increase in steel prices on the Coast is a tendency for manufacturers who have long used steel to look even more carefully for substitute materials. Aluminum and plastics are being given more attention by users of sheets and small merchant shapes. Because of the volume production of the light metal in Arizona, California, Oregon and Washington, and its availability in sheet and extrusions at relatively low shipping costs, West Coast manufacturers are more than casually interested.

As straws in the wind might be mentioned the extensive use of aluminum tubing in the place of steel pipe for portable overhead irrigation systems, irrigation siphons, roofing and siding, household equipment, and motor vehicles of all types. True, the lightweight of the material has been an important, if not determining, factor in its selection, but as the price curves of steel and aluminum get closer, its use is being extended.

Some western steel salesmen, thinking ahead a few years, are not unaware of this competition and some of them who have had customers trying to get along on curtailed shipments mention the merits of aluminum.

IT is known that the Henry J. Kaiser organization has plans for the use of plastics in auto bodies and other producers have mentioned possibilities in this field.

These threats to steel consumption apparently are not taken too seriously in the West where productive capacity continues to increase. Pacific States Steel Corp. at Niles, Calif., is reported as going ahead with plans to install four 100-ton openhearths which would approximately double the present capacity of the plant to about 200,000 tons per year. The two electric furnaces now operating there produce approximately 90,000 tons per year, and will supplement openhearth production as needed.

Kaiser Co., Inc., at Fontana, Calif., Bethlehem Pacific Coast Steel Corp. at Los Angeles, South San Francisco and Seattle, and Columbia Steel Co. at Pittsburg, Calif., and Torrance, Calif., are all increasing ingot capacity or planning to do so.

One of the problems facing all western producers with the exception of Geneva Steel Co. in Utah, is where the scrap is to come from to keep them operating. It is the conclusion of some well-informed steel men that it will be a long time—if ever—before the West Coast again becomes a scrap rich area.

For the immediate future there isn't too much optimism being expressed over the possibility of appreciable quantities of Pacific scrap being returned. Ship breaking continues in what buyers term a "dilatory" manner and industrial scrap is dribbling into the trade. West Coast scrap prices reacted to the eastern upward movement in a modest manner considering the scarcity of the metal and the inviting offers being made by eastern buyers.

Last week West Coast buyers were offering to pay $22.00 to $22.50 per gross ton for No. 1 heavy melting scrap at outlying points and to pay the freight to their furnaces. Some purchasing agents were limiting the freight bill to $4.00 per gross ton which would mean a delivered price of approximately $26.50 on the Coast whereas the same scrap in Pittsburgh was bringing up to $42.00 per gross ton.

Pig iron continues to keep a respectable few dollars in price above scrap and offers no incentive to use it to replace scrap in the charging boxes. Basic pig was selling last week on the Coast for $42.94 and was not easy to come by.

LOS ANGELES—Using aviation design and engineering principles, the Davis three-wheeled all-aluminum coupe was exhibited here recently. The car weighs 1328 lb and will seat four passengers on a 64-in. seat. The Davis will sell for $995 f.o.b. Los Angeles. Company engineers claim that no driving maneuver, no matter how violent, can overturn the car. Production is expected to commence at the rate of 50 a day within 90 days, Gary Davis, president, Davis Motorcar Corp., stated.

The company plans on setting up

Controlled Horsepower

Thudding hoofs pound a stirring accompaniment to the roar of the throng as the field thunders down the stretch to the finish. Strong hands, steady nerves, and experience guide the winner home.

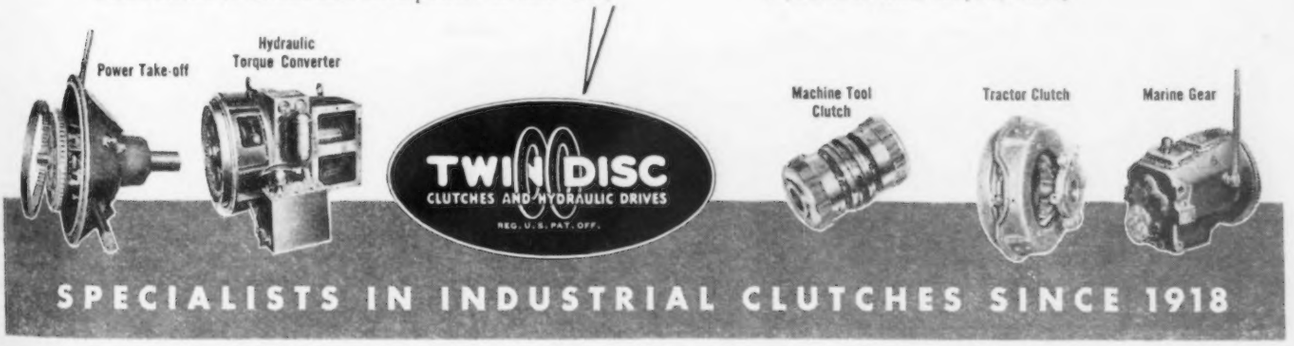
Holding tight reins behind powerful, high-strung trotters and pacers is definitely a game for grizzled veterans. Years in the sulky teach the secret of driving "short miles." Skill at rating a horse along to get maximum performance in every heat is acquired only in competition.

Experience also is the key to the proper control and transmission of mechanical horsepower. In this field, the Twin Disc Clutch Company has accumulated 29 years of specialized experience . . . experience in designing, manufacturing, and applying Friction Clutches and Hydraulic Drives.

This cumulative experience of Twin Disc engineers is available to you. Ask for their recommendations when selecting units to control or transmit power on your particular job.

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin

(Hydraulic Division, Rockford, Illinois)



SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

a nationwide dealership organization. Davis said ten pilot models will be available within 60 days, to be shown in key cities throughout the country.

The all-aluminum body, set on a tubular frame, is composed of 26 separate panels which are replaceable and interchangeable. The power plant of the car is a 60 hp Hercules four-cylinder motor. Overall dimensions of the tricycle type car are 15 ft long, 72 in. wide, 58 in. high. Ground clearance is 8 in., wheel base 108 in., and tread 60 in.

A hard top is quickly removable to make the Davis a convertible model. Additional features of the car include a single plate 72-in. curved windshield, three-wheel hydraulic brakes, a 20-gal fuel tank, and 25-cu ft baggage compartment. The car is reported to make 35 to 40 miles per gal in city traffic.

In tooling the Davis for production, company engineers have held three considerations as their prime goal. First, that the assembly methods be simplified to the ultimate; second, that all components be completely interchangeable; and third, that there should be true fairing of all body contours, and a proper evenness of fit between the various panels. They believe that they have accomplished these objectives by simplicity of design; advanced tooling methods; and an assembly line with only 12 positions.

Former aviation men are supervising the work on the car. The prototype has been in experimental and testing stages for 4 years. Joseph Charipar is vice-president in charge of engineering, and Peter Westburg is chief engineer.

* * *

Philippine Consolidated Shipyards, affiliated with Consolidated Steel Corp., has been awarded an extension to Dec. 31, 1947, of the original contract covering the repair of small Army vessels at Manila and Cavite, Philippine Islands. The company completed this month ahead of schedule a similar contract for the Navy Dept., covering the repair of Navy tugs, barges, landing craft, and other small vessels at Samar in the Philippine Islands.

SALT LAKE CITY—Ratification by the several locals of the CIO International Union of Mine, Mill & Smelter Workers of the agreement reached between the Kennecott Council of the union and Kennecott Copper Co. is generally expected to bring about stability in the copper producing areas of Utah, Nevada and New Mexico.

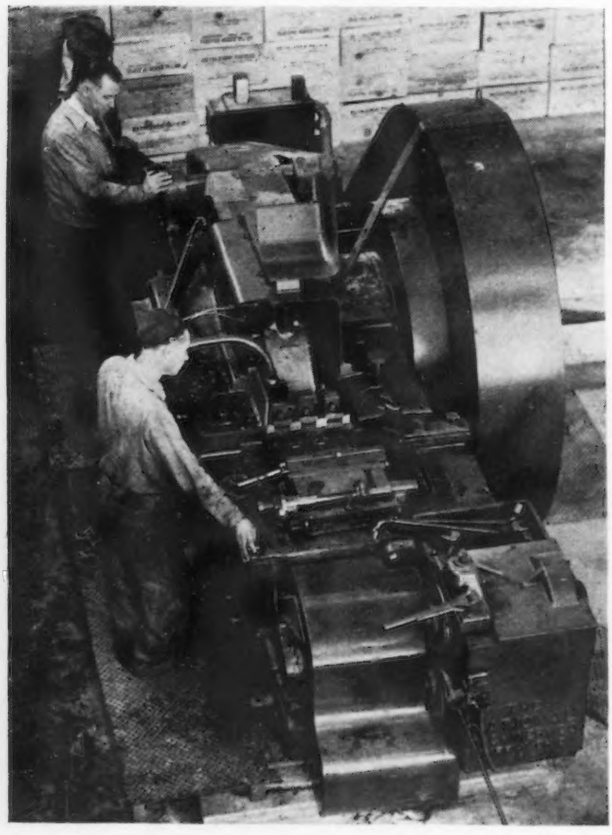
The Kennecott Council accepted the 12¢ per hr increase and six paid holidays offered by the Kennecott Co. last week, and it is thought that this agreement will set a pattern for the industry.

Both sides in these negotiations apparently made an earnest effort to avoid a work stoppage and some of the minor hurdles which might well have brought about a blowup were avoided in the final settlement.

SEATTLE—Included in the large sums voted for expenditure in this state by Congress is $13 million for the Bonnevilie Power Administration which will be used largely for the extension of electric power transmission lines in western Washington and for Columbia Basin Reclamation Project.

There is a general return of optimism in the heavy industrial field as the labor situation has quieted down and large construction jobs are in the offing. Perhaps reflecting only the increase in civilian population in the area, nonetheless the figures recently released by the U. S. Census office showing that the number of employed residents of Seattle's metropolitan area has increased 43 pct since March 1940, are being highly touted as indicative of a healthy and prosperous condition. A sample census showed an increase in employment of from 176,000 in 1940 to 253,000 at present. Contrary to the general trend, the census figure showed that 56 pct more women are employed now than in 1940. This employment jumped from 50,000 to 77,000. The census report further indicates that approximately 90 pct of the returned veterans of the recent war are now employed and that approximately 10 pct are going to school or are unemployed.

The Renton plant which was occupied during the war by Boeing Aircraft Co. for the construction of B-29's has been released by the WAA for use as a multiple occupancy facility. Located on the southern shores of Lake Washington, this modern factory has at various times been mentioned as a potential General Motors plant, Northwest Airlines Maintenance plant, and actually has been used as a storage base for the Navy, Airforce and Boeing.



° ° °

BATS OUT BOLTS: *The 16-ton National Machinery Co. boltmaker just installed at Bethlehem Pacific's South San Francisco steel plant makes 70 ½x5-in. machine bolts a minute. The machine takes 9/16-in. rods and upsets them, trims the head, points the bolt and forms the thread as part of one integrated operation.*

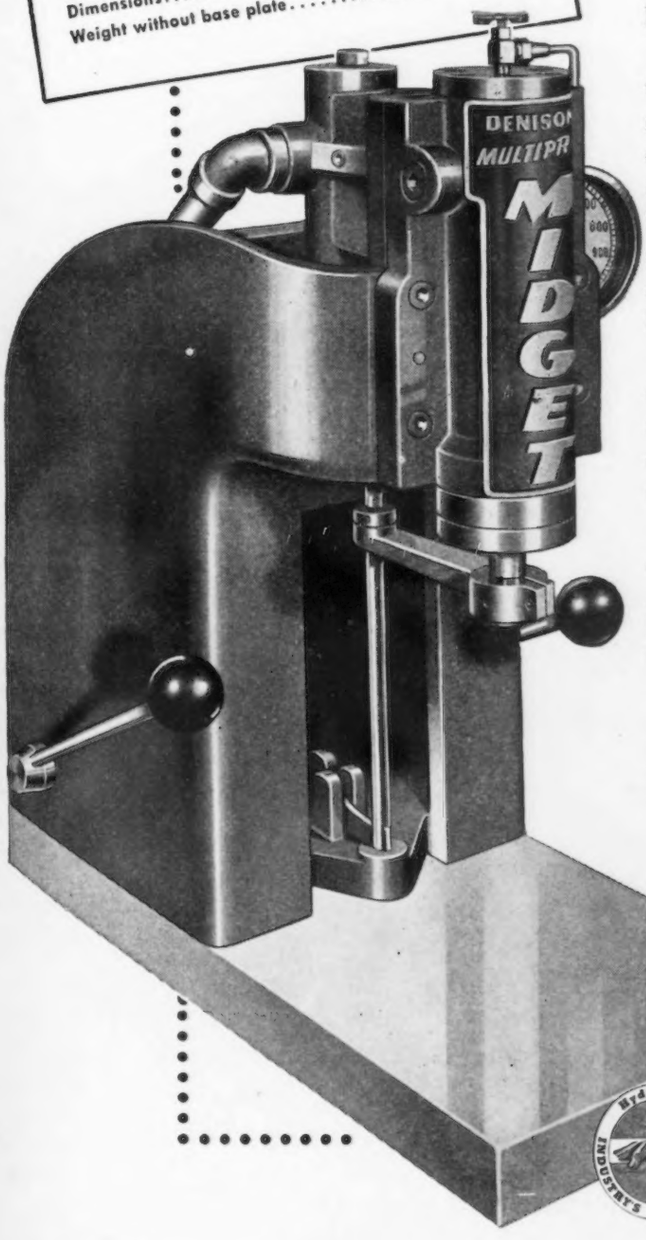
° ° °

Meet the new MULTIPRESS MIDGET

...a little press for big production

SPECIFICATIONS (basic unit)

Capacity (ram effort)	1 ton
Stroke	6"
Ram speed adjustable up to	400 ipm down—600 ipm up
Daylight	10" or 14"
Throat depth	5"
Base Plate tooling area (optional)	10" x 10" (standard)
Dimensions	24¾" high x 17" deep x 18¼" wide
Weight without base plate	130 lbs.



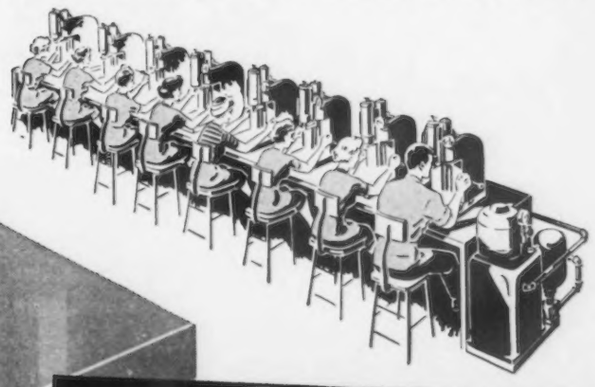
Here's the new, low cost, MULTIPRESS MIDGET especially designed for your pressing requirements between 200 and 2000 lbs. ram effort. All the famous, production-boosting features of the larger size MULTIPRESSES are found in the MIDGET. Vibratory repeat strokes, fast approach and slow pressing speed, either dual hand lever or foot pedal safety controls—plus adjustable stroke length, ram speed and pressing effort.

The MULTIPRESS MIDGET is ideally suited for multiple or "gang" installations and for successive operation requirements. Up to 12 units may be used with a single, centralized power source. When more than one MIDGET is used, each unit has individual pressure adjustments. The MIDGET may be operated in any position, and is easily adaptable to other hydraulic machinery as an accessory unit for pressing, feeding, clamping and countless other production tasks.

Optional equipment includes choice of three base plate designs, non-rotating ram guides, interchangeable valves for manual or vibratory action, adjustable daylight, and a choice of four pumping units for operation either individually or in series of 4, 8 or 12 MULTIPRESS MIDGETS.

Write today for descriptive bulletin on this newest addition to the MULTIPRESS line.

THE DENISON ENGINEERING COMPANY
1158 DUBLIN ROAD • COLUMBUS 16, OHIO



HydrOILics INDUSTRY'S RIGHT HAND

DENISON EQUIPMENT in APPLIED HydrOILics

PERSONALS

• **A. A. Nelson,** veteran assistant general sales manager of the Keystone Steel & Wire Co., Peoria, Ill., has retired. He joined Keystone 41 years ago. **William H. Getz** has been named manager, merchant sales of the company. Mr. Getz, under the reorganization of the sales department following Mr. Nelson's retirement, will supervise the distribution of Keystone agricultural products through jobber and dealer channels. Promotion of Mr. Getz to this position comes after 12 years' association with the company.

• **W. D. McElroy** has been made manager of the development department of Pittsburgh Consolidation Coal Co.'s research and development division, Pittsburgh. He will be in charge of all pilot plant operations in the company's program of coal gasification. Mr. McElroy was formerly with the United Gas Improvement Co., of Philadelphia, in research and development work on a variety of problems in the gas industry.

• **Charles E. Nelson, Jr.,** who has been director of purchases and planning production for Waukesha Motor Co., Waukesha, Wis., has been appointed to the newly-created position of assistant to president James E. De Long and will continue his other duties.

• **Nicholas Bashark** has been appointed staff engineer in charge of aircraft products, Parker Appliance Co., Cleveland. Mr. Bashark will assume direction of the broadened company program of aeronautical equipment development. Prior to joining Parker, he was head of hydraulic and related engineering for the Air Materiel Command at Wright Field, where he served 11 years.

• **Thomas J. Garrison, Jr.** has taken over the eastern Michigan territory on Aro air tools for the Aro Equipment Corp., Bryan, Ohio. Other new appointments include **Joseph Donlan,** as assistant to E. J. Somerville, in the Chicago territory. **Edward Messervey,** formerly salesman in the Detroit Aro branch on automotive air tools, has been transferred to the factory sales division in Bryan.

• **Roy E. Greenwood** has been appointed district sales manager for the New York and New England districts of American Chain Div. of American Chain & Cable Co., Inc. He will make his headquarters at New York. Mr. Greenwood has been with the company for 16 years. For the past several years he has been assistant manager for the Pacific Coast territories, and prior to that was at the Bridgeport, Conn., Philadelphia and Chicago offices.

• **Julius A. Kayser** has been appointed assistant to the president of Laclede-Christy Clay Products Co., St. Louis. Mr. Kayser has been with the company for the past 24 years. He has served in various capacities in the research, operating and sales departments.

• **James W. Kinnear, Jr.** has been appointed executive vice-president of the Firth Sterling Steel & Carbide Corp., McKeesport, Pa. Mr. Kinnear has resigned his position of assistant manager of operations of the Pittsburgh district of the Carnegie-Illinois Steel Corp. to accept the new position. He has been a director of Firth Sterling since 1932.

JAMES W. KINNEAR, JR., **executive vice-president, Firth Sterling Steel & Carbide Corp.**

• **W. O. Trownsell,** chief metallurgist of the wire division, Continental Steel Corp., Kokomo, Ind., since 1936, has been appointed chief of metallurgy and inspection for the company. Mr. Trownsell became associated with Continental in 1931 as a chemist. Until 1936, he also was engaged in experimental and research work for the company.

• **E. B. Dodds** has been named as head of the roofing and siding division of Permanente Products Co. **Fred Drewes** will head the pig and ingot sales division and will be assisted by **J. L. Joubert,** product specialist, and **T. W. F. Foster,** sales engineer. **Milt Eisele** will be in charge of the building materials division. Headquarters sales office for Permanente Products will be maintained in Oakland, Calif.

• **Robert Craig** has been named purchasing agent, Oglebay, Norton & Co., Cleveland. Mr. Craig, who has been with Oglebay, Norton & Co. since 1940, succeeds **T. R. Ramsey, Jr.,** who has resigned.

• **Richard H. Means** has been appointed to the new position of assistant controller of the National Gypsum Co., Buffalo. Prior to joining the company in 1942 as auditor, he operated his own accounting business in Buffalo.

• **John H. Hruska,** until recently director of tests and inspection for Electro-Motive Div. of General Motors Corp. at La Grange, Ill., has resigned. Mr. Hruska joined Electro-Motive in 1935 as chief metallurgist after previous connections with Carnegie-Illinois Steel Corp., International Harvester Co., Danly Machine Specialties, Inc., and Skoda Works, Ltd.

• **Howard H. Loving** has been appointed factory representative of the Adalet Mfg. Co. in the Chicago district. Mr. Loving was originally employed by the Central Illinois Public Service Co. He then was employed by the Public Service Co. of Northern Illinois. From there he joined the Republic Steel Corp., Steel & Tube Div., with whom he had 11 years' service supervising and promoting the sale of light wall conduit.

FREDERICK J. RIKER, president, Livingstone Engineering Co.

• **Frederick J. Riker,** former manager, forge blanks division, Crucible Steel Co. of America, has been named president of Livingstone Engineering Co. of Boston. He succeeds **Carter C. Higgins,** who has been elected chairman of the board. Mr. Higgins is vice-president of Worcester Pressed Steel Co.

• **C. P. Walker** has been appointed to head up the textile industry activities for the general mills section, industrial sales department, Westinghouse Electric Corp., East Pittsburgh. Prior to his transfer he was in the corporation's Atlanta office.

• **Kenneth D. Sargent** has been named district representative for General Electric Co.'s wiring devices in the central district. Mr. Sargent joined the company at Bridgeport, Conn. last year, following service in the Army.

• **Claude H. Auger** has been placed in charge of production engineering of both aircraft gas turbines and turbosuperchargers at the General Electric Co., Lynn, Mass. plant; **Joseph S. Alford** in charge of development engineering for aircraft gas turbines, and **Richard C. Robin** in charge of engineering general service. **S. R. Puffer** succeeds R. G. Standerwick, recently resigned, as engineer in charge of the division. **D. F. Warner** has been made designing engineer.

• **Russell A. Keck** has been elected vice-president in charge of sales of the Kendall Refining Co., Bradford, Pa. He has been a director of the concern since 1945.

• **L. B. Shapleigh** has been appointed contracting manager of the Cincinnati district of the Bethlehem Steel Corp. He will manage the designing, engineering and sales activities of all Bethlehem products used in construction industries in Southern Ohio, Southern Indiana, Kentucky and Tennessee.

• **Col. Frank H. Higgins** has been elected vice-president of Hupp Corp., and will head Hupp's Detroit operations. Colonel Higgins was for many years an executive with Willys-Overland Co. Since the end of the war he has been president of the Fostoria Screw Co., which position he recently resigned to become associated with Hupp.

• **Raymond V. Pfautsch** has been named chief engineer of the Ilg Electric Ventilating Co., Chicago. He succeeds **A. G. Sutcliffe,** who has retired after serving a total of 37 years with ILG, and as chief engineer for the past 20 years. Mr. Pfautsch entered ILG's employ in 1929 as a member of the engineering department, specializing in new product development. In 1940 he became assistant chief engineer, a post he occupied until his present advancement.

• **Frank G. Davis** of Peninsular Steel Co., Detroit, has been appointed general sales manager of the Ohio, Michigan and Illinois corporations. Mr. Davis will continue to have his headquarters at Detroit. **George E. Kuhnle** has been named vice-president and manager of the Ohio corporation. **William I. Trader** becomes vice-president and assistant manager of the Michigan corporation. **Norman B. McKeagan** has been appointed vice-president and manager of the Illinois corporation with headquarters at Chicago. **Henry W. Hartwick** becomes secretary of the Ohio, Michigan and Illinois corporations with headquarters at Detroit.

• **Hugo A. Leander,** vice-president, general manager and a director of the W. L. Maxson Corp., New York, has been elevated to the presidency, to succeed the late William L. Maxson. Mr. Leander is also chairman of the executive committee and a director of Victor Electric Products, Inc., Cincinnati, and president and a director of the Unimax Switch Corp. of New York. New members of the board also elected include **William L. Maxson, Jr., William E. Hocker, W. Hubert Beal** and **Harold Kondolf.**

• **Arthur B. Austin** has been appointed assistant manager of the explosives department's Chicago branch office of Hercules Powder Co. Mr. Austin joined Hercules Powder Co. in 1933. During the past 14 years he has been a sales and technical service representative in the explosives department.

• **A. R. Kelso** has been appointed executive vice-president of the Warren City Mfg. Co. and the Warren Stamping Co., both of which are subsidiaries of the Federal Machine & Welder Co., Warren, Ohio. Mr. Kelso joined Warren City Mfg. Co. from the Rock-Ola Mfg. Corp., Chicago, where he served as executive vice-president for the previous 3½ years. Prior to his connection with Rock-Ola, Mr. Kelso was assistant general manager of the U. S. Cartridge Co., division of Western Cartridge Co.

A. R. KELSO, executive vice-president, Warren City Mfg. Co. and Warren Stamping Co.

S. J. MORAN, works manager, Union Steel Castings Div., Blaw-Knox Co.

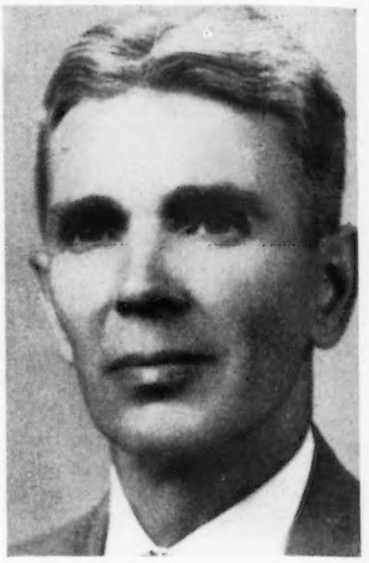
• **S. J. Moran** has been advanced to works manager and **J. L. Daugherty** has been appointed to succeed him as assistant treasurer and production manager of Union Steel Castings Div. of Blaw-Knox Co., Pittsburgh. Mr. Moran started at Union Steel Castings as an office boy and has served on nearly every job in the shop and office. Mr. Daugherty, a certified public accountant, was employed by a well-known accounting firm before joining Blaw-Knox in 1941. He served as an accountant with the parent company and then assumed the position of division auditor at Union Steel Castings.

• **Don E. Fricker,** former advertising manager for the Le Roi Co., has been appointed assistant advertising manager of the Heil Co. at Milwaukee.

• **S. J. Coffey,** former manager of Cummins Diesel Sales Corp. of Illinois, has been appointed manager of regions of the Cummins Engine Co., Inc., Columbus, Ind. Mr. Coffey joined Cummins Diesel Sales Corp. of Illinois 4 years ago as office manager, later serving as sales manager and then manager. **Byron A. Duling** has been appointed manager of engine distribution with headquarters at Columbus. He has been a Cummins employee since 1936, having served as a sales engineer and later as manager of the Cleveland regional office. **Raymond Boll** has been appointed assistant manager of the Cleveland region. Mr. Boll served with the Army Signal Corps and was released in 1946 and returned to the Cummins sales department where he was employed before his military service. **W. C. Phillips** has been made assistant manager of the southeastern region. Mr. Phillips has been a member of the Cummins organization since 1935, having been a field service representative, statistician for the service department, and sales engineer. He will make his headquarters at Columbus.

• **Edwin J. Lewis** has been appointed manager of petroleum company sales for the replacement tire sales division of the B. F. Goodrich Co., Akron, Ohio. Mr. Lewis succeeds **Howard F. Miller,** who has been assigned other duties.

• **John R. Gregory** has been appointed Pacific Coast representative for the steel plant sales of Blaw-Knox Co., Pittsburgh.



GEORGE D. FRAUNFELDER, director of engineering and research, Easton Car & Construction Co.

• **George D. Fraunfelder,** formerly chief sales engineer of Easton Car & Construction Co., Easton, Pa., has been appointed to the newly-created office of director of engineering and research. Mr. Fraunfelder has been with Easton as a design engineer since 1926.

• **H. H. McIntyre** has been appointed general industrial agent and **H. C. Kniebusch** has been appointed industrial agent of the Wabash R.R. Co. with offices in St. Louis.

• **B. H. Bean, Jr.** has become associated with Apex Alkali Products Co., Philadelphia, in the production end of the business. He recently spent 3 years in the service. He will represent Apex in New England with headquarters at New Haven, Conn.

...OBITUARY...

• **J. Paul Arens,** 57, works manager for Ceco Steel Products Corp., Chicago, died on July 29. Mr. Arens had been associated with the Truscon Steel Co. for many years before coming to Ceco in 1937.

• **J. H. Schnibbe,** service engineer at Crucible Steel Co. of America's Cincinnati branch, died recently after a long illness. Mr. Schnibbe was associated with Crucible for over 38 years in several capacities having previously been a salesman at the Cleveland branch for 20 years.

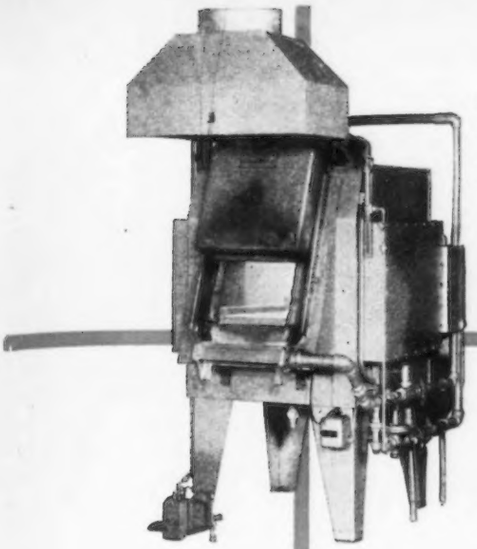
• **Albert R. Curtis,** 76, general purchasing agent for the National Enameling & Stamping Co., Milwaukee, died July 22. He had been with the firm 52 years.

• **Harry N. Syster,** 55, supervisor of mill sales for Latrobe Electric Steel Co., Latrobe, Pa., died July 21. Mr. Syster was associated with Latrobe Electric Steel for 30 years and had been in his most recent position for 10 years.

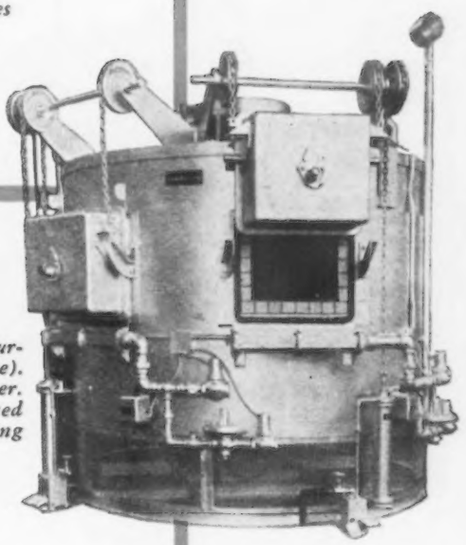
• **William E. Yunker,** 67, former assistant works manager at the Allis-Chalmers Mfg. Co., Milwaukee, died July 22.

• **J. Carroll Kennedy,** vice-president of the Kennedy Valve Mfg. Co. of Elmira, N. Y., died recently. He had been vice-president in charge of manufacturing for 20 years.

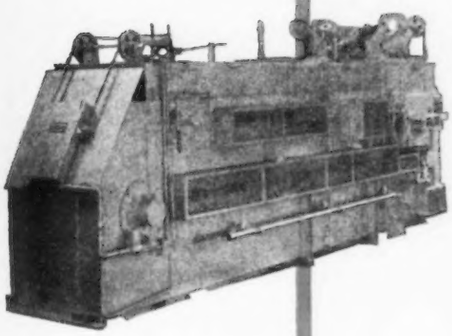
• **Orran J. Richardson,** 46, general superintendent of the Watkins Body Corp., Buffalo, died July 23. He started with the firm 23 years ago as a mechanic.



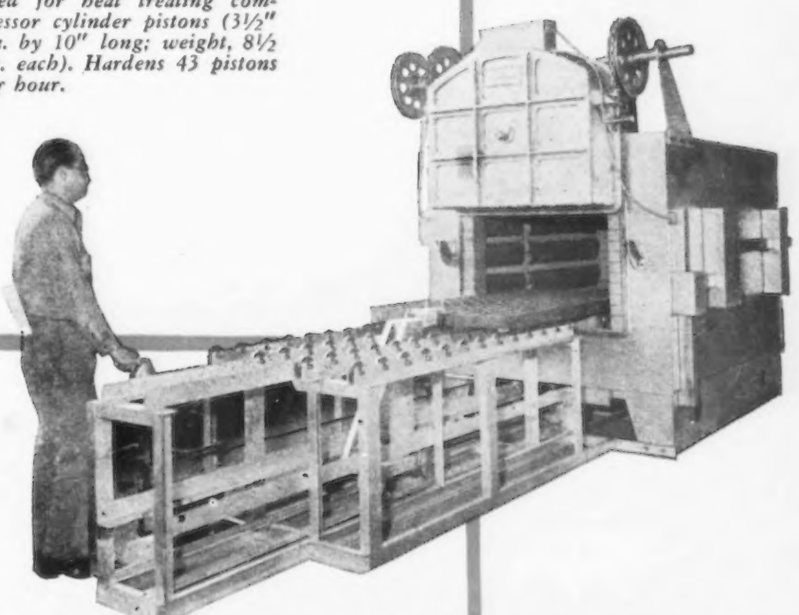
Toolroom Hardening Furnace (controlled atmosphere). Used for heat treating punches, dies and shear blades.



Rotary Hearth Hardening Furnace (controlled atmosphere). Work chamber 48" in diameter. This particular furnace used for hardening wire drawing dies.



Conveyor Hardening Furnace (controlled atmosphere). Work chamber 12 inches wide by 12 feet deep by 18 inches high. Used for heat treating compressor cylinder pistons (3½" dia. by 10" long; weight, 8½ lbs. each). Hardens 43 pistons per hour.



Production Box Furnace (non-atmosphere). Has air operated roller grid. Used for hardening, annealing and stress relieving large die casting dies.

LINDBERG ELECTRIC FURNACES

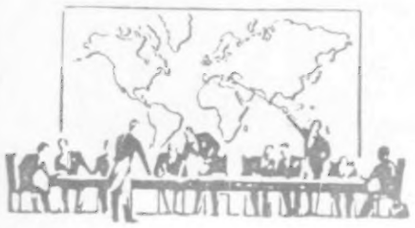
For Hardening, Annealing and Stress Relieving

Lindberg Electric Box, Rotary, and Conveyor furnaces come in a complete range of standard chamber sizes — box furnaces from 8" x 13" x 5" to 48" x 96" x 38" and up; rotary hearth furnaces from 26" to 60" diameter and up; and conveyor furnaces from 12" x 72" x 8" to 36" x 16' x 18". For additional information write, Lindberg Engineering Company 2452 W. Hubbard Street, Chicago 12

LINDBERG  **FURNACES**

European Letter . . .

• French economic situation indicates that policy of defending the franc is no longer practicable . . . Devaluation and an attempt to achieve stability at a new level imperative.



LONDON — Monsieur Ramadier has survived the greatest challenge yet presented to his government. When France's 1,200,000 civil servants threatened recently to strike for higher wages, the authority of the Prime Minister was obviously undermined. No regime can survive if its own immediate servants cease work and for several days the issue seemed in doubt.

But, in the event, M. Ramadier contrived first to transfer the wage dispute over the disparity between the government offer—a 21 billion franc increase—and the Civil Service claim of 28 billion to the assembly; then he checked an incipient Socialist revolt by raising the government offer to just over 24 billion francs; and finally he secured the chamber's approval by a unanimous vote. The Civil Service Union, with rather bad grace, accepted the award.

The government's ability in recent weeks to govern without the Communists, to settle one paralyzing strike—that of the railway men—to avoid another and to end with a unanimous vote in the Assembly has created a growing impression that perhaps the worst of France's post-war political troubles are over and that M. Ramadier has found a governmental formula capable of reconciling the hostile and divergent political factors out of which he is supposed to forge an administration.

The impression is, however, premature. It overlooks the very narrow margin by which M. Ramadier's policy received the endorsement of the Socialist Party. It overlooks the continuance of strikes in other sections of industry and the slowness with which the miners are returning to work.

Above all, it overlooks the fact that M. Ramadier's victory in the dispute, first with the railway men and then with the civil servants, was gained only at the cost of making an enormous addition to state expenditure and of abandoniug, tacitly perhaps but finally, the effort initiated by M. Blum last Christmas to peg wages and prices and check runaway inflation.

THE conclusion to be drawn from the French economic situation is that the policy of defending the franc is no longer practicable and that, at some stage, devaluation and an attempt to achieve stability at a new level must come. The present phase in France is, therefore, hardly the beginning of a new epoch. It is rather the end of an old, of the *expérience Blum.* The fundamental question —whether the French economy can recover stability and coherence—has yet to be answered.

The problem of achieving stability is not primarily economic. The means for economic revival in France undoubtedly exist. The reconstruction of the country has made great strides; in transport in particular, remarkable work has been achieved. Large sections of industry are working well. Coal production is greater than before the war, and the output of electricity has risen considerably. The peasants are producing as much food as in a normal year and have saved large reserves of gold and currency.

Nor, to judge by expenditure on the one hand and bank reserves on the other, are large sections of the *bourgeoisie* in bad economic straits. Yet the separate achievements of the various sectors in the French economy do not add up to a unified and productive whole. The cog wheels are turning, but they do not mesh, and the reason for this maladjustment is hardly economic at all. It is political and moral, and its roots lie in distrust.

The truth is that France has not yet achieved the measure of social cohesion necessary for its economic system to work smoothly. The dream of the Resistance has faded and French society is back in the *impasse* which destroyed the Popular Front in 1936. The *bourgeoisie* are not reconciled to the passing of a large measure of political and even economic power to the organized working class, and their response today, as in 1936, is a sort of concealed strike. Then it took the form of a flight from the franc to foreign currency. Today, exchange control restricts this possibility.

The answer is therefore hoarding, tax evasion, failure to invest and luxurious spending. The government, lacking sufficient revenue from taxation and unable to induce saving, cannot balance the budget and has resorted to inflation. But the workers, pinched by rising prices and conscious of their greater political influence, resort to the weapon of the open strike for higher wages, and thus the inflationary spiral spins the faster.

The peasant, unable to purchase consumer goods and losing confidence in the currency, eats more himself and feeds wheat to his animals. Now, for the first time, he has himself threatened to strike, in order to receive a better price for his deliveries of grain. Thus he adds his spin to the spiral of increasing food costs and wage demands.

Strictly speaking, the economic answer to all these problems is known—to increase taxation, to insure investment, to cut state expenditure, to balance the budget and to restore confidence in the franc. But the political answer is

Reprinted from The London Economist by special permission.—Ed.

DESIGNED FROM THE DRAWING BOARD FOR

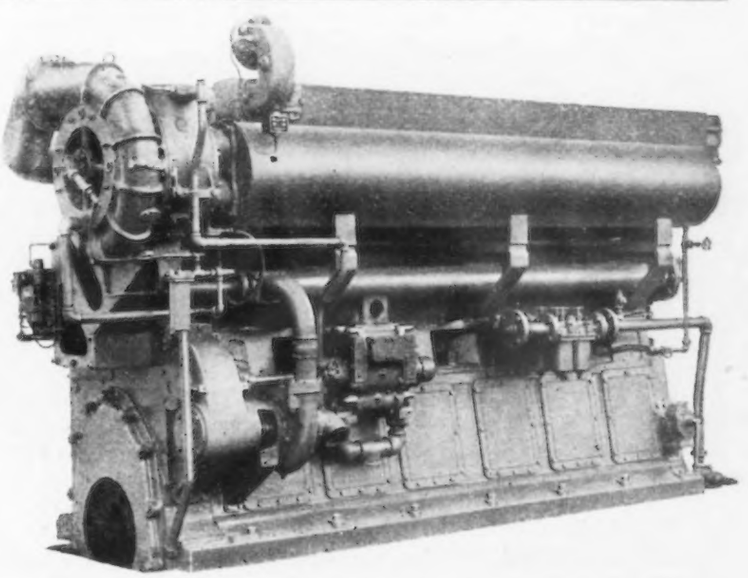
SERVICE with MEEHANITE® CASTINGS

All products of The Cooper-Bessemer Corporation, Mount Vernon, Ohio, are designed for and built with MEEHANITE castings. The gas-diesel engine illustrated and its crankshaft are typical examples of units providing the durability, service and superiority which may be achieved through the combination of proper design and the BETTER engineering characteristics of MEEHANITE castings.

This gas-diesel engine, the type which recently set a new thermal efficiency record of 40%, contains in addition to its MEEHANITE crankshaft such important castings as the base, pistons, main bearing caps, cylinders, cylinder liners, valve rocker arms and many others.

High tensile, fatigue and torsional strength properties are provided for the crankshaft. Similar characteristics combined with uniformity, density and solidity, are the reliable features of MEEHANITE castings which may be utilized by all users of castings. For detailed information write

MEEHANITE®
Pershing Square Building, New Rochelle, N. Y.



TAKE YOUR CASTING PROBLEMS TO A MEEHANITE FOUNDRY

American Brake Shoe Co.
Mahwah, New Jersey
The American Laundry Machinery Co.
Rochester, New York
Atlas Foundry Co.
Detroit, Michigan
Banner Iron Works
St. Louis, Missouri
Barnett Foundry & Machine Co.
Irvington, New Jersey
Builders Iron Foundry Inc.
Providence, R. I.
H. W. Butterworth & Sons Co.
Bethayres, Pennsylvania
Continental Gin Co.
Birmingham, Alabama
The Cooper-Bessemer Corp.
Mt. Vernon, Ohio and Grove City, Pa.
Crawford & Doherty Foundry Co.
Portland, Oregon
Farrel-Birmingham Co., Inc.
Ansonia, Connecticut
Florence Pipe Foundry & Machine Co.
Florence, New Jersey
Fulton Foundry & Machine Co., Inc.
Cleveland, Ohio
General Foundry & Manufacturing Co.
Flint, Michigan
Greenlee Foundry Co.
Chicago, Illinois
The Hamilton Foundry & Machine Co.
Hamilton, Ohio
Kanawha Manufacturing Co.
Charleston, West Virginia
Kinney Iron Works, Inc.
Los Angeles, California
Koehring Co.
Milwaukee, Wisconsin
Johnstone Foundries, Inc.
Grove City, Pennsylvania
The Henry Perkins Co.
Bridgewater, Massachusetts
Pohlman Foundry Co., Inc.
Buffalo, New York
Rosedale Foundry & Machine Co.
Pittsburgh, Pennsylvania
Ross-Meehan Foundries
Chattanooga, Tennessee
Shenango-Penn Mold Co.
Dover, Ohio
The Stearns-Roger Manufacturing Co.
Denver, Colorado
Traylor Engineering & Mfg. Co.
Allentown, Pennsylvania
Valley Iron Works, Inc.
St. Paul, Minnesota
Vulcan Foundry Co.
Oakland, California
Warren Pipe & Foundry Corporation
Phillipsburg, New Jersey
Washington Machinery & Supply Co.
Spokane, Washington
E. Long Ltd.
Orillia, Ontario
Otis-Fensom Elevator Co., Ltd.
Hamilton, Ontario

"This advertisement sponsored by foundries listed above."

one that has eluded Frenchmen for the last 30 years.

WHAT are M. Ramadier's chances of achieving the minimum social cohesion necessary for his task of stabilization? The answer concerns not only the prospects of French recovery, but the chances of revival throughout Western Europe for, without France as an active partner, it is hardly possible to talk of a Marshall Plan at all.

In some ways, the outlook today is rather more promising than it was a few weeks ago. The parliamentary mechanism of the Fourth Republic is clearly working more efficiently than that of the Third, however much politicians may have retained their old idiosyncrasies.

More important, however, is the evidence of a new approach in industry. For the first time since 1936, the employers' organizations and the CGT and the Christian unions have conferred together on problems of wage and industrial policy, and in quick, good-humored session, reached agreement upon an increase in minimum wages, the provision of more consumer goods (at prices ensuring a reasonable return) and joint consultation within industry. The substance of the agreements is, of course, inflationary in effect. They will be backed by the government in a general 10 pct increase in the minimum wage and a general removal of the old 5 pct cut in prices. In other words, the *expérience Blum* is to be formally buried.

But the willingness to hold talks and the publicity given to them in the trade union press suggest a more hopeful atmosphere in industry. There is some evidence that the workers are tiring of political strikes. Recently, many Communist mass rallies have been poorly attended. Such a mood will not lead to a Communist change of heart, but it could herald a change in tactics. The metalworkers' union recently issued a special call to its members for greater effort and higher production. It is possible that, for a time, the strike wave may abate.

Unhappily, these signs of a greater reasonableness within the French economy are almost nullified by the increasing division on foreign policy. At this point, the analogy with 1936 breaks down. So long as Germany loomed on the French horizon, the vast majority of Frenchmen were at least united in the search for security. The removal of the Germans as an actual menace leaves the nation suspended between the Easternizers and the Westernizers, and the split over the Marshall offer has made the division more acute and bitter.

The Communist Party is obviously determined to work with all its strength to prevent any integration of Western Europe and has found in the fact that the American government wishes to include Germany in the plan a formidable engine of attack. Thus, while the plan might, from the economic standpoint, provide precisely that element of confidence which is lacking, it runs the risk of increasing France's divisions in the political sphere.

IT IS here that British and American diplomacy can have an important, even a decisive, effect upon the restoration of French stability. Both countries have vital interest in making every contribution within their power, since the alternatives to M. Ramadier's coalition—a Communist government on the left or a Gaullist combination on the right — would write finis to broad plans of democratic revival in Western Europe or on the continent generally.

In theory, the economic assistance possible under a Marshall Plan might turn the scale between stability and further disintegration next winter. American assistance could pursue a double policy in attacking the basic problem—lack of confidence in the franc. The provision of dollars or gold could underpin the currency and imports of consumer goods could begin to create a corrective process by tempting food and goods market, restoring the purchasing power of wages and increasing the incentive to produce more.

Against such a background, a devaluation of the franc could mean not the first step in a fatal *dégringolade*, but the firm establishment of the currency at a more rational level. The chief American contribution to its ally's stability is thus to insure that the Marshall conception is accepted by Congress and supported as a factual plan at the earliest possible moment.

At the same time, the economic clauses should not be fitted into a political framework which nullifies them. British and American diplomacy has been remarkably clumsy in recent weeks. By preparing on an exclusively Anglo-American basis a new project for a revived German industry, just at a time when the discussions on the Marshall offer were beginning, the two allies have delivered a diplomatic rebuff to M. Ramadier's government on which the Communists have instantly and joyously seized.

By allowing the belief to grow that this revived industrial production in the Ruhr would have priority in the Marshall approach, they have drawn from M. Ramadier the bitter remark that "the victims should at least be considered before the executioners." The wise decision to postpone the announcement of the proposed level of industry plan creates the opportunity to repair the diplomatic blunder, but clearly, M. Ramadier cannot survive Communist criticism of his cooperation with Britain and America unless he can provide solid guarantees that France's security is not to be sacrificed.

THE American offer of a 40-year military pact is a first step and indeed, in the light of American history, a revolutionary step. But a military guarantee is only an earnest of final victory, whereas France is anxious not to become a battlefield at all. The crux of the problem, therefore, lies in the Ruhr itself—in insuring that its industrial development is not achieved at the cost of France's recovery and in associating the French, as soon as possible, with the control of the area.

If the British and the Americans can make specific proposals on these points, they can do more than simply weaken Communist criticism. They can give the Ramadier government an important political victory and thus add to its own internal stability.

Since confidence is the commodity in shortest supply in France today, any accession of strength behind the coalition must have a beneficent effect throughout the body politic. So far, M. Ramadier has done little more than keep his balance. To exercise genuine leadership, he needs firmer ground beneath his feet. Both economically and diplomatically, Britain and America can contribute to that underpinning, and of all their tasks in Europe, none is more urgent or promises a better reward.

TYPE "A" ASSEMBLY BIT

COMMON SCREWDRIVER

CLUTCH HEAD *Performance Is a Matter of Record*

These few selected quotations, from users of CLUTCH HEAD Screws, tell a definite story of CLUTCH HEAD performance as compared with the use of all other types of screws...not in "test runs," but in day-to-day production.

50% "CLUTCH HEADS sent our production up a straight 50%"
... Lestershire Spool & Mfg. Co., Johnson City, N. Y.

30% "Change to CLUTCH HEAD increased our production 30%"
... France-Sporting Co., New York 12, N. Y.

22% "Our heater assembly costs cut 22%"... *Monroe Stove Co., Chicago.*

20% "We find a 20% increase in assembly operation"
... Quam-Nichols Company, Chicago.

"STEPPED UP PRODUCTION and eliminated cabinet damage"
... Norge Refrigerator Division, Detroit, Mich.

20% "Now get SIX instead of FIVE truck body assemblies"
... The Lindsay Corporation, Chicago.

15% "A 15% step-up in assembly driving operation"
... Hicks Body Company, Lebanon, Ind.

Conclusive evidence like this should indicate the possibility of a substantially increased tempo on your assembly line. In addition to the speed factor, investigate the exclusive CLUTCH HEAD *features that contribute to safer, easier, lower-cost driving, plus simplified field service. Send for screw assortment, sample Type "A" Bit, and Brochure.*

CLUTCH HEAD · SCREWS

UNITED SCREW AND BOLT CORPORATION

CLEVELAND 2 CHICAGO 8 NEW YORK 7

Industrial News Summary...

- **Scrap Still on the Loose**
- **Steel Prices Up 10.7 Pct**
- **Multiple Pricing Doomed**

THE STEEL scrap market this week was still on the loose. Its inflationary gyrations surpass even the hectic World War I days in 1917. Nor was there any sign this week except wishful thinking that a peak had been reached in scrap prices or that a downward trend would soon develop. This situation was giving steelmakers their worst case of jitters since wartime days when production at any cost was their chief problem.

During no peacetime period in the nation's history has the price of scrap stayed so high for so long a time. This condition stems from wartime dissipation of scrap supplies, the current demand for steel, and the long-term scrap shortage. Sharp advances of scrap prices occurred this week at Buffalo and Chicago. At Pittsburgh the price of heavy melting steel this week is $1.75 a ton above the average price in June 1917 when a peak was reached at $41 a gross ton.

The average price of heavy melting steel at Pittsburgh, Chicago and Philadelphia advanced 92¢ a gross ton this week and pushed THE IRON AGE steel scrap composite price to a new high of $41.75 a gross ton. The strength in the market has been spectacular despite the absence of some large buyers from the market. Unless the price of scrap declines from the ridiculously high figures in today's market, the steel industry may find its pricing policies completely demoralized and stabilized costs out of the question.

THE steel price increase recently put into effect by steel producers averaged $6.17 per net ton according to the revised IRON AGE finished steel composite price, which is weighted to the shipments of the various major products included in the composite. The index this week is 3.17956¢ a lb compared with 2.87118¢ a lb in the week previous to the price advance. The average price for finished steel today is about 10.7 pct above what it was 2 weeks ago and 37.6 pct above the average for 1939.

For the first time in a good many years major firms in the steel industry this week were operating on a multiple price basis for such products as semi-finished steel, galvanized sheets, enameling sheets and long ternes. The price lists issued by the U. S. Steel Corp. subsidiaries indicated that their prices on galvanized sheets are $2 a ton less than other major producers, $1 less on enameling sheets and $4 a ton less on long ternes, a product extensively used by the automotive industry.

With customer relationships and strong competition involved in today's steel market, despite the heavy overall demand, it is unlikely that the price differentials will last very long. There are indications from some sources that independent steelmakers will meet U. S. Steel's lower prices on some items but so far this week the situation was not clear cut.

The inroads being made by aluminum sheets may cause sober reflection on the multiple prices for galvanized steel sheets and the knowledge of the importance of automotive buying may cause a change in the price of long ternes. Some steel sources believe that the multiple prices on some products will continue as long as the current tightness in steel deliveries exists. But based on steel industry history such an opinion may be wishful thinking. The same general situation applies to a lesser degree in the price of semi-finished steels, which in some cases are $5 a ton lower than quotations which were posted by some independent producers.

THERE was little or no squawking from steel consumers this week over the new high prices for the simple reason that most manufacturers were expected to pass the increases along to the ultimate consumer. Availability of steel was still the major worry of steel users and not the price. But it is known that some manufacturers have insisted that their production men make a close study of steel costs and inventory control. Such surveys, it is believed, will determine in some instances whether or not other metals than steel should be used.

The steel ingot rate this week was unchanged from last week's revised rate of 95 pct. Producers are having a tough time raising their operations above the 95 pct figure, but once this is done it is expected that the average rate for the country will be at least one to two points higher for some months to come.

Most mills are still declining orders and new inquiries show no letup. There have been no representative cancellations or delivery deferments because of the steel price increase. Mill books are filled through this year except for a few items such as cold-finished bars, electric welded tubing and large hot-rolled rounds. Some customers are pressing mills to take orders for 1948 delivery but have been unsuccessful in their attempt.

According to some reports stainless steel prices may not be advanced. One large maker was understood to have about made up its mind not to advance its quotations on this product. It is recalled that for the past several months many stainless steel products have been readily available to consumers. Some tool steel prices were advanced this week.

• **EXPORT CONTROLS** — Revision of export control regulations was announced by he Commerce Dept.'s Office of International Trade last week (THE IRON AGE, July 24, p. 99). The first change specifies that no application for export license may be made unless the applicant has a firm order for commodities covered by the application. OIT's move is designed to strengthen its control over shipments through this prohibition on blank-check export licenses. The second change bans use of export licenses covering orders canceled prior to effective date of the license. Both changes are effective July 29.

• **CAST IRON PIPE INCREASE**—Producers have announced an increase of $3.50 per ton in cast iron pipe prices based on the recent pig iron price rise. Prices of cast iron fittings have been raised $5 per ton, confounding those predicters of a two for one pipe fitting increase.

• **STAGGERED HOURS**—The British demand for electricity has risen by 70 pct since 1939 and is still rising. The government has laid upon the regional boards for industry the task of working out plans to shift one third of the peak load. This will mean a staggering of hours throughout industry, with a good deal more night work. The trade unions are sympathetic to the plan and are expected to cooperate, but there will be difficulties to smooth out. As regards rates of pay, it is hoped that the example of the engineering industry will be followed; here agreement has been reached to pay the usual night-work rates. The government will compel employers to fall in with the plans drawn up by regional boards.

• **SWEDISH PLANS**—Swedish industrialists have warned their government that they will be unable to fulfill the $55½ million worth of orders for electrical equipment and machinery which the Soviet Union has placed in Sweden this year under a trade agreement unless more labor is forthcoming. New plans announced by the Swedish Minister of Labor have five main aims; namely, increased production per manhour, the influx of foreign workers, the recruiting of more female labor, the greater use of partly disabled workers and a pruning of the civil service.

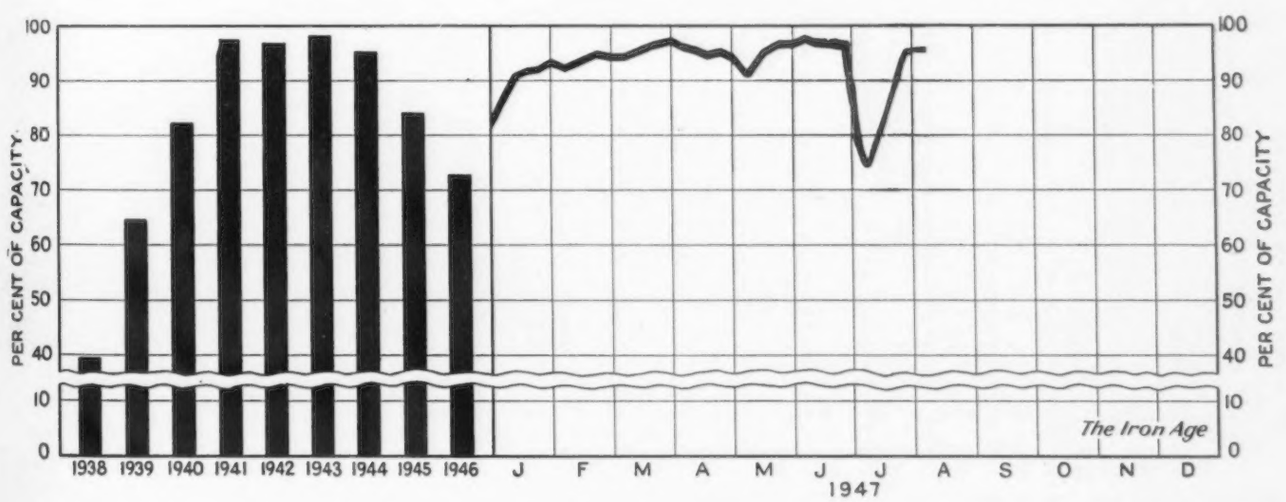
• **CANADIAN WAGES**—Humphrey Mitchell, Canadian minister of labor, says that total salaries and wages paid in the Dominion in 1946 set an all-time high of $5,112,000,000, exceeding the wartime peak year of 1944 by $153,000,000 and being more than double the $2,540,000,000 reported for 1939.

• **MOHAWK STEEL**—A $9 million order for 100,000 tons of reinforcing bars for Turkey awaits the successful bidder for the $5 million Dunkirk, N. Y., steel plant operated during the war by Allegheny Ludlum. WAA opened bids June 10 and turned them over to its real property division for investigation. Mohawk Steel Corp., submitted the top bid, $2,250,000. Thomas L. Armstrong of Chicago, manufacturers' agent, said that he plans to lay up Canadian cargo ships for the winter in Dunkirk Harbor, loading them as the bars are produced and sailing when the ice breaks in the spring.

• **TOO BAD**—Inland Steel Co. had planned to increase its output of iron by blowing in the former DPC blast furnace which has just been completed. Part of this production was to have been merchant iron. Unfortunately the same week the new furnace was blown in the company was forced to take its No. 3 unit off due to breakthrough. This furnace will be down about seven weeks and the company will not be able to increase its iron supply as was originally planned.

• **LABOR MARKET**—Easing of the labor market is reflected by the dropping quit rates from a wartime 75 pct of all separations to the present 63 pct; wartime layoffs of 7 pct have increased to 28 pct. The Bureau of Labor Statistics reports that during May industrial hiring fell from 51 to 47 per 1000 workers while layoffs rose from 10 to 15 per 1000 workers. Quit rates fell from 37 to 34 during the month. On the other hand, the hiring rate for iron and steel rose as layoffs continued at a low lovel. Shortages of steel and parts brought a jump in the layoff rate in the automotive industry; a subsantial rise in force reduction is evident in aircraft manufacturing as contracts are being completed.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
July 29	102.0	95.0	90.0	95.0	97.0	102.0	90.0	99.0	100.5*	105.5	97.0	84.5	94.0	95.0*
August 5	102.0	95.0	89.5	95.0	94.5	102.0	90.0	99.0	101.0	100.5	96.5	84.5	94.0	95.0

* Revised.

BORED CONTOURS AIR-TRACED

for greater accuracy

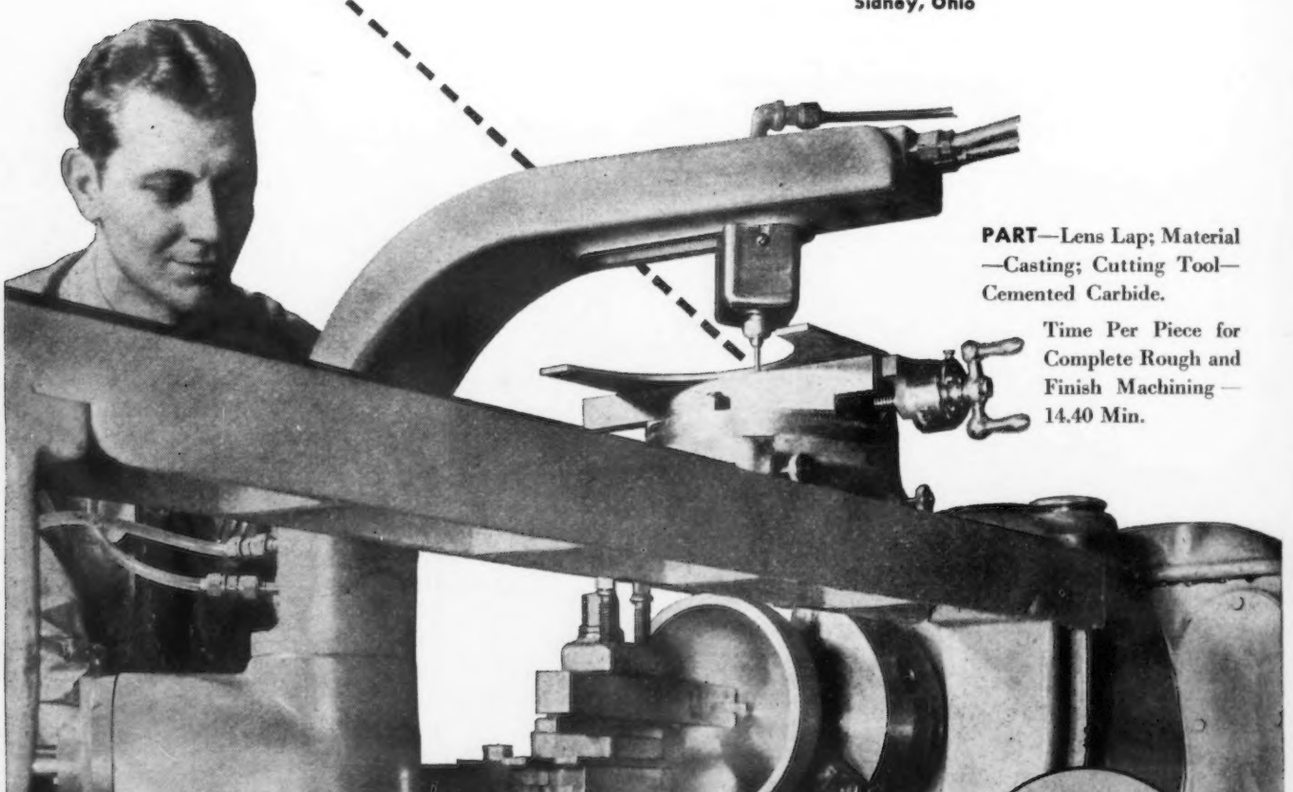
Molds, dies and similar contour boring jobs are a "natural" for the Monarch Air-Tracer.

With this new lathe attachment you can handle such work faster, for lower cost—and *more accurately*—because the cutting tool motion is stepless. Finish is better, tolerances are closer; the slightest change in template shape is instantly translated into slide feed.

On jobs where accuracy is all-important, this ability to follow contours closely pays off in dollars saved—by increased production, by closer tolerances, by fewer rejects. That's why the Air-Tracer was selected for the lens lap job illustrated; the final lens can be no more accurate than the machine that makes the lap. And the machine's accuracy isn't subject to human errors, either—the Air-Tracer's operation is continuous and automatic.

Whether you're boring or turning contours; machining tapers, step shafts or ordinary production lathe jobs, the Monarch Air-Tracer can save you time and money. Like more details? Ask for bulletin 2601.

THE MONARCH MACHINE TOOL COMPANY
Sidney, Ohio



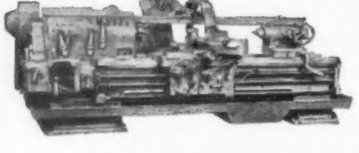
PART—Lens Lap; Material—Casting; Cutting Tool—Cemented Carbide.

Time Per Piece for Complete Rough and Finish Machining—14.40 Min.

FOR SPEED, ACCURACY AND FINISH, THE MONARCH AIR-TRACER*

1. **Stepless cutting-tool motion provides a superior continuous finish.**
2. **Setup times averaging five to ten minutes permit profitable use for a wide variety of small-lot production jobs.**
3. **Automatic yet versatile operation results in economical, accurate high production.**

Available exclusively on the new Monarch Lathes.



ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES

Steelmaking Oxygen Presenting Problems to Delay Applications

New York

• • • **Widespread interest** in the use of oxygen in the melting of iron and steel has found operators encountering many difficulties in trying to develop applications on a widespread scale. They are still trying to figure the economics of such a practice.

Four of the major problems involved in the use of oxygen in the openhearth are as follows:

(1) Excessive dirt.
(2) Changes in incentive wage rates.
(3) Correct capacity for the oxygen generator.
(4) Advisability of the alternative use of compressed air.

As in most developments, many of the advantages which were expected to be gained by the use of oxygen have now proved to have their shortcomings. Operators agree that carbon reduction can be accomplished much faster with the use of oxygen, particularly if the gas is injected directly into the metal. Everyone also agrees that before oxygen can be widely adopted in iron or steel melting, the cost of oxygen per ton must be made cheaper. The cheapest possible unit cost can only be had in generating plants of high capacity.

Although openhearth superintendents were enthusiastic in experimenting with the new process, they are equally reticent in asking for the necessary facilities to produce ample oxygen at low cost. The primary stumbling block, which the openhearth superintendents face, is the fact that they cannot predict how much oxygen they will use for a given turn. Openhearth heats frequently bunch themselves so that the flow of oxygen needed for all furnaces on the floor would show widespread fluctuations in demand.

No openhearth superintendent cares to authorize the expenditure for an oxygen plant whose rated capacity will meet the top demand of a dozen or 15 openhearths, when he knows from practice at least 50 pct of the time the top output of the generating plant cannot be used and that he may have to bleed oxygen off into the atmosphere. Any cost reduction he can show in making heats

Dirt Plus Unpredictability Of Oxygen Requirements Are Big Questions

o o o

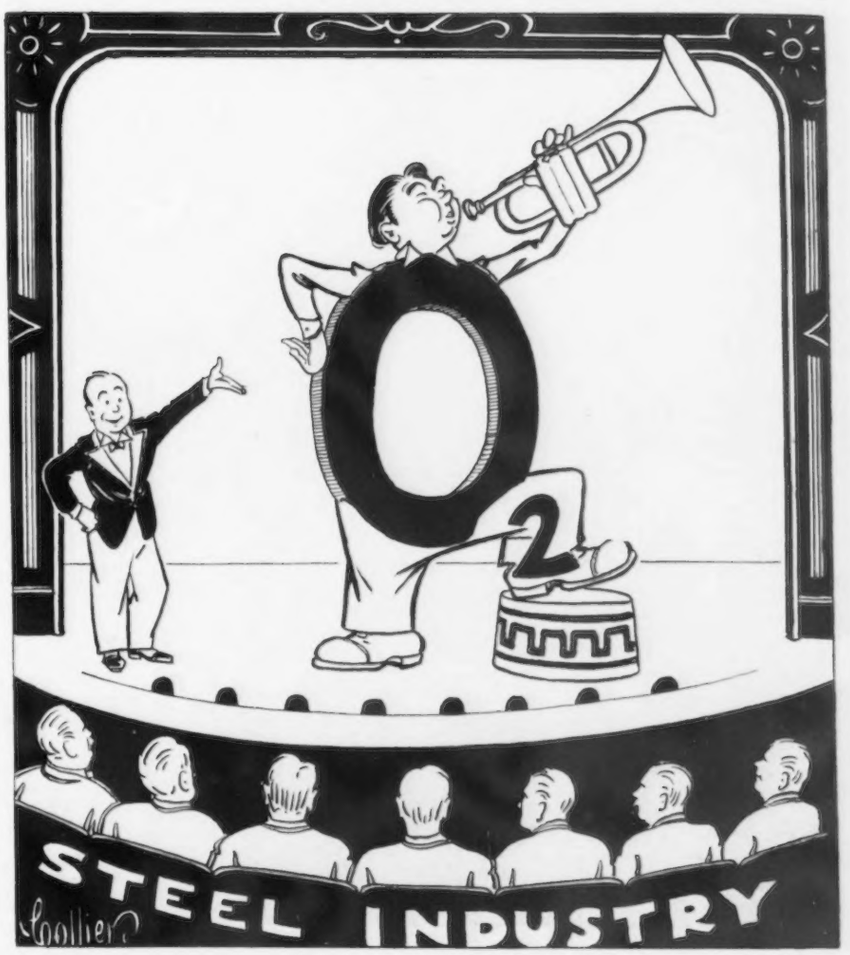
might, therefore, be lost in the overall use of the practice. Inasmuch as oxygen which is generated cheaply comes off at atmospheric pressure, the storage problem of that portion of the gases which cannot be immediately used is one of astronomical proportions.

Immediately after it was discovered how fast the carbon could be reduced using oxygen, some of the plants tried the same thing with compressed air. These plants were not entirely surprised when they found that compressed air injected into an openhearth bath would reduce carbon almost as fast as would oxygen. This discovery demonstrated that turbulence of a more intimate mixture of slag and metal was probably the most important feature in the reduction of carbon in the steelmaking bath.

Many of the operators who have tried both compressed air and oxygen declare that in cost per ingot of steel melted, compressed air is much cheaper. In addition they don't have to install an oxygen generating plant whose top capacity they cannot economically predict. These operators state that the oxygen may pull the carbon down faster than compressed air but that economically the advantages of oxygen have been somewhat overstated.

These same operators state that there is one exception where the use of oxygen may be cheaper and more economical than compressed

The Newcomer



air. This exception is the use of oxygen to melt down the scrap charge. After the heat is melted and under a slag it appears that the faster carbon reduction accomplished with oxygen is too expensive compared to the procedure using compressed air.

Another troublesome problem has been the fact that the operators have found that they must adjust the wage incentive on openhearth furnaces where oxygen is applied. One company has three shops in which a few furnaces are operating with the oxygen practice. In each of these shops they have been compelled to establish three different levels of incentives. Steel mill men say they have had enough labor trouble and that tampering with the incentives of the openhearth melting crews is something they would rather not touch. As far as wages are concerned, the use of compressed air presents the same problem.

Ed. note: News that National Steel Corp. will spend approximately four million dollars on an oxygen plant for iron and steelmaking has pointed up the steel industry's interest in this subject. This article outlines some of the problems connected with the widespreal application of oxygen in the steel industry.

Perhaps the greatest obstacle which the operators must overcome, before they can successfully apply either oxygen or compressed air directly to the steel bath, is the problem of dirt. An openhearth furnace is usually a comparatively clean steel melting unit. When oxygen or compressed air is injected into a molten bath the fumes and dirt that are ejected re emble those of a bessemer.

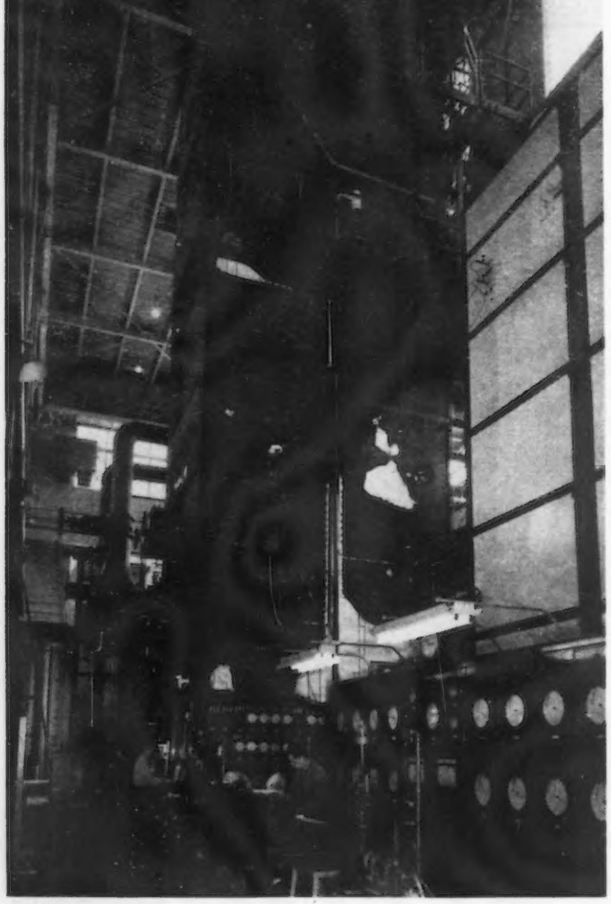
With most large steel making cities either contemplating or having in effect dirt ordinances, the mills are hesitant about adopting the widespread use of oxygen. In fact, one producer was forced to discontinue the use of oxygen until it could install some sort of system of dirt control. The firm is experimenting with washers and will not again use oxygen on a wide scale until the washers or dirt collectors have been installed. Other producers are following this development closely and are postponing any action on the widespread use of oxygen in openhearths until they are certain that there is an economical method of controlling the dirt generated by the practice.

The use of oxygen in the blast furnace presents an entirely different problem. With most blast furnaces equipped with downcomers and dust collectors the dirt problem is not much of a hurdle. However, blast furnace operators are still very hesitant about enriching the blast to the extent recommended by the producers of oxygen equipment. Because of the nature of blast furnace operation, the operator never knows what he did wrong until eight hours after he has done it. With 2000 tons of coke, limestone and ore supported by blast pressure, in a stack two or three hundred feet high, bridging, channeling and hotspots are possibilities that the blast furnace operators have to consider.

In blast furnace operation, the top capacity of an oxygen generating plant is not a problem. The blast furnace department knows exactly how many cu ft of air must be blown through the furnace per hour. The capacity of an oxygen plant for any pct enrichment can, therefore, be computed definitely. The demand for oxygen will remain constant in blast furnace operation, day by day and week by week. However, the burden of the furnace must be changed if the blast is enriched to any appreciable extent. The type of coke, size and strength, its distribution, and how much to add per ton of ore must be rejuggled if the furnace operator switches to the oxygen practice.

According to many blast furnace men, the best application of oxygen in the blast furnace would be on a furnace making ferroalloys, where the coke charge is extraordinarily high. Making straight basic or merchant iron, the blast furnace operators agree that some increase in tons per hr is possible when using oxygen. Here again simple logistics enter the picture, although they are not as serious as in openhearth production.

The integrated steel producers



o o o

LARGEST UNIT: *This gaseous oxygen producing unit has been under test for several months testing the results of a program of research at the Linde Air Products Co.'s East Chicago plant. The unit produces about 4.8 million cu ft of 90 pct oxygen per day.*

o o o

over the years have figured their blast furnace iron production very close to what their steelmaking furnaces can handle. The capacity of their mixers or where hot molten iron is stored, has been worked out and the tonnage of the openhearth or bessemer plants have all been correlated on past practice. If such steel producers were to switch even half of their blast furnaces to oxygen, they might not be able to take full advantage of the higher production rate possible. In other words, it would be very possible that inside of a week the whole plant would be up to its ears in hot metal or cold pig.

At present, the great demand for merchant iron by the foundries offers an outlet for the increased pig iron production which the steel melting units might not be able to handle. However, the steel producers do not calculate long term investments like oxygen generating plants on conditions which may change in a year or two. Even if they started by partially enriching the blast of one blast furnace with the intention of eventually swinging over all the blast furnaces to oxygen, they would have to start a long term development and enlargement program in steelmaking facilities.

The most intensive use of oxygen on any melting floor in the country has been in electric furnace shops. The practice has been applied here, as many electric furnaces were idle because of a lack of alloy or stainless steel demand. By using oxygen in these shops the mills have merely taken advantage of the present steel shortage to more fully experiment with oxygen in a melting unit whose ingot production could be handled by the present soaking pits of the rolling mills.

The dirt problem in electric furnaces is just as bad as that in openhearths. However, the number of electrics is so small that the total dirt generated by using oxygen in these units does not seem to be enough to cause the steel producers to become entangled with local dirt ordinances.

Now that the steelmaker has a method of faster ingot production, which does not involve the complicated equilibrium of chemical reactions all of which are reversible, we can be assured he will use this tool wherever possible. However, the industry faces the disadvantages that have been pointed out. Eventually, oxygen will find its place as an aid to the steelmaker. Many operators claim that the companies producing generating equipment have been too enthusiastic and have not given full thought to many of the operating problems involved.

Aside from the obstacles enumerated above, other problems have been encountered. When using oxygen through the burner of an openhearth furnace, the companies have found that on normal furnace compaigns the checkers clog up much faster than usual. In addition, roof temperatures are usually higher and as the life of the silica brick roof governs how long an openhearth furnace will operate before being taken off, this particular feature troubles many operators.

When injecting oxygen or compressed air into the molten bath by jet, or any other way, the excessive splashing has proved detrimental to the life of the silica brick roof. The operators hesitate to install basic or chrome brick roof as the expense of such a roof is very much higher than that made with silica brick.

Many laymen who have read the widely publicized merits of the use of oxygen in steel melting assume that this practice will be generally adopted by all producers very soon. This wil not be the case. The first general use of oxygen will be primarily restricted in large scale operations to the blast furnaces. Whether to use oxygen or compressed air for carbon reduction in the openhearth is still far from settled.

The wage incentive problem, plus the fact that steel producers view such things from a long range standpoint, will also slow down the use of either oxygen or compressed air no matter how good it sounds. For the past month operating superintendents have been attempting to get the oxygen problem child on paper. As yet there have been entirely too many question marks on the paper which management wants answered before they go all out for the process.

The obstacles encountered so far are not entirely unsurmountable. They are, however, of such fundamental nature that the industry will proceed very slowly and deliberately. The adoption of oxygen in iron and steelmaking is therefore a long-term somewhat painful task which will not be completed for some years to come. In fact, the openhearth melters may discard oxygen entirely and settle for compressed air.

Blast Furnace Capacity and Production—Net Tons

	Number of Companies	Annual Blast Furnace Capacity	PRODUCTION							
			PIG IRON		FERRO-MANGANESE AND SPIEGEL		TOTAL		Pct of Capacity	
			June	Year to Date	June	Year to Date	June	Year to Date	June	Year to Date
DISTRIBUTION BY DISTRICTS:										
Eastern	11	12,551,280	867,773	5,430,201	24,271	152,560	892,044	5,582,761	86.4	89.6
Pittsburgh-Youngstown	16	25,042,040	1,862,717	11,515,754	17,267	88,004	1,879,984	11,603,758	91.2	93.4
Cleveland-Detroit	6	6,557,500	469,945	3,010,216			469,945	3,010,216	87.1	92.5
Chicago	7	14,097,710	1,045,894	6,183,430			1,045,894	6,183,430	90.2	88.4
Southern	8	4,924,670	327,219	1,947,228	8,359	54,209	335,578	2,001,437	82.8	81.9
Western	4	2,536,000	186,364	1,087,429		11,297	186,364	1,098,726	89.3	87.3
Total	36	65,709,200	4,759,912	29,174,258	49,897	306,070	4,809,809	29,480,328	89.0	90.4

Source: American Iron & Steel Institute

Steel Company Earnings Fall 22 Pct in Second Quarter

New York

• • • **Second quarter earnings** of the American steel industry were about 22 pct below first quarter earnings. Not all companies showed this drop—a few actually topped their first quarter income. But the accompanying tabulation of reports from 16 companies representing 84 pct of the nation's steelmaking capacity shows that second quarter net incomes were less than 80 pct of those earned during the first 3 months of this year.

Among the companies that distinguished themselves by increasing profits during the second quarter are American Rolling Mill, Pittsburgh Steel, Alan Wood and Keystone Steel & Wire. The three top producers showed profit declines higher than the average. U. S. Steel earned 25 pct less, Bethlehem was 23 pct lower and Republic's net was down almost 55 pct from its first quarter figure.

The industry as a whole operated at about ½ of 1 pct of capacity higher during the second quarter of 1947 and sales volume was higher during that quarter too. U. S. Steel and Bethlehem each reported a gain of approximately 11 pct in billing; Jones & Laughlin sales were about 8 pct higher.

Taking account of construction costs, which are rising faster than original estimates and depreciation reserves, several companies transferred additional sums to surplus, thereby reducing their second quarter net. U. S. Steel allocated an extra $6.7 million for this purpose. Youngstown Sheet & Tube set aside an additional $2 million.

Production Costs Rising But Latest Price Rises Are Seen as Corrective

o o o

By GEORGE F. SULLIVAN
Assistant News Editor

o o o

Second quarter steel earnings have been adversely affected by rising costs, all sources agree. These include April wage increases, and a zooming scrap market as their major components. Higher coal costs, generally estimated at anywhere from 80¢ to $1.50 a ton of steel, were not felt during the second quarter.

But the full effect of the latest wage increases, granted as of April 1 in most cases, has not been reflected in second quarter earnings. According to Charles R. Hook, president, American Rolling Mill Co., "At any given time the tonnage of products in process through the plants is equal to 6 to 8 weeks' volume of finished product shipments." He explained therefore that a considerable portion of shipments in the second quarter were made from steel completely or partially processed before the increase in costs occurred. Mr. Hook was referring to his own company's operations but because of other cost factors the non-integrated plants would, it is held, be in about the same relative position on this factor.

The American Iron & Steel Institute estimates that steel costs have risen since Jan. 1, 1947, by an amount equal to $10 a ton on 1947 production. This estimate is broken down as follows:

Freight rate increase	$ 75,000,000
Steel wage increases	240,000,000
Fuel oil increases	30,000,000
Scrap price increases	160,000,000
Miscellaneous (incl. copper, tin, lead and palm oil)	11,000,000
Higher coal costs (at $1 per ton)	90,000,000
Total cost increases (per year)	$606,000,000

Since the latest steel price increases average approximately $6 a ton it might appear to some steel consumers that another boost of $4 a ton would be required to preclude a dismal steel profit picture for the balance of 1947.

But there is one fact which—barring a major upheaval in the economy or further sharp scrap price rises—makes the possibility of such an increase a remote one. It is that except for a slight rise in scrap prices the estimate of the American Iron & Steel Institute could be projected back to, say, Dec. 15, 1946 with only a slight increase in the $606 million estimate.

Generally speaking, the fourth quarter of 1946 was a good one for steel earnings. Some observers say that as the year 1946 drew to a close the steel producers saw obvious cost increases ahead. This look into the future explains, they maintain, why there was a general increase of base prices and extras late in December and during the first week in January, amounting to between $5 and $6 a ton.

On this basis, it is argued, these two price increases amounting in all to about $11 a ton, should almost cover the increased costs which have and will hit the industry during 1947. Thus—again barring

STEEL COMPANY EARNINGS

COMPANY	Second Quarter 1947	First Quarter 1947	Year 1946	Year 1945
UNITED STATES STEEL CORP.	$29,336,868	$39,243,511	$88,622,475	$58,015,056
BETHLEHEM STEEL CORP.	12,408,966	16,090,426	41,731,931	34,947,116
REPUBLIC STEEL CORP.	5,214,820	11,516,795	16,033,469	9,543,443
JONES & LAUGHLIN STEEL CORP.	5,366,124	6,337,132	10,854,084	8,082,082
YOUNGSTOWN SHEET & TUBE CO.	3,099,099	7,335,749	14,254,905	7,512,250
NATIONAL STEEL CORP.	5,775,757	7,325,058	20,461,651	11,117,764
INLAND STEEL CO.	6,125,431	7,995,857	15,556,897	9,861,210
AMERICAN ROLLING MILL CO.	6,312,104	5,918,876	18,552,491	9,414,647[3]
SHARON STEEL CORP.	1,498,249	1,886,918	2,857,856	1,029,074
WHEELING STEEL CORP.	2,841,804	2,948,270	5,372,910	3,950,252
CRUCIBLE STEEL CO. OF AMERICA	376,214	891,810	527,417	1,565,847L
PITTSBURGH STEEL CO.	1,170,415	716,472	45,640	709,442L
ALAN WOOD STEEL CO.	502,432	491,593	793,941	307,738
ALLEGHENY LUDLUM STEEL CORP.	1,688,031	1,829,609	6,599,346	3,379,369
CONTINENTAL STEEL CORP.	248,231	393,223	946,119	612,543
KEYSTONE STEEL & WIRE CO.[14]	4,837,955	1,342,815	3,379,018	1,623,223
GRAND TOTAL	86,802,500	112,253,423	246,590,150	157,120,478

U. S. Steel Corp.

ITEMS	Second Quarter 1947	First Quarter 1947	Fourth Quarter 1946	Year 1946	Year 1945
Net income	$29,336,868	$39,234,811	$31,215,636	$88,683,530	$58,015,056
Dollars per share	$2.65	$3.78	$2.86	$7.29	$3.76
Sales in $ millions	$534	$475	$472	$1485	$1740
Shipments—net tons	5,288,716	4,843,674	4,902,742	15,247,752	18,410,264
Pct ingot operations	98.1	97.9	87.4	72.9	82.0
Average employees	285,915	275,961	276,237	266,727	279,274
Total payroll	$223,855,192	$199,675,743	$195,746,115	$694,114,463	$786,721,918
Average pay per employee	$783	$724	$709	$2602	$2817
Pct payroll to sales	41.9	42.0	41.8	46.7	45.2
Net income per ton of shipments	$5.55	$8.10	$6.37	$5.82	$3.15

Bethlehem Steel Corp.

ITEMS	Second Quarter 1947	First Quarter 1947	Fourth Quarter 1946	Year 1946	Year 1945
Net income	$12,408,966	$16,090,426	$11,937,281	$41,731,931	$35,947,116
Dollars per share	$3.61	$4.84	$3.45	$11.79	$9.52
Sales (in millions)	$266	$238	$226	$788	$1327
Shipments—net tons	2,330,000	2,197,000	.....	7,284,952	8,545,957
Pct ingot operations	99.3	98.0	85.1	77.6	91.7
Average employees	141,500	140,400	140,655	143,742	202,095
Total payroll in millions	$108	$101	$97	$383,120,952	$624,337,285
Earnings per hr	$1.592	$1.486	$1.492	$1495	$1.401
Pct payroll to sales	40.6	42.4	43.1	48.6	47.0
Net income per ton of shipments	$5.32	$7.32	.....	$5.73	$4.20

serious inflation—the need for further price increases is virtually ruled out for 1947. Some sources feel that the cost-price ratio prevailing during the first quarter of this year has again been approached.

It is not inconceivable then, according to informed observers, that at current operating rates third quarter earnings may approach the first quarter figures. This should furnish the industry with the additional funds it must set aside to meet sharply rising maintenance, repair and new construction costs.

Those who disagree with this line of reasoning—and there are many in the steel industry—point to two unknowns which could cut sharply into third quarter earnings: Scrap and freight rates. Scrap prices rose again this week and no one can say certainly where they'll stop. Any additional freight rate increase would boost all raw material costs, taking many more millions off the profit side of the ledger.

U. S. Steel Export Co. Announces New Carbon Steel Price Schedule

New York

• • • **Upward revisions** in export prices of carbon steel products have been announced here. It is reported that U. S. Steel Export Co. has issued a new schedule of prices, effective Aug. 1, to take account of the domestic price revisions. These are prices, subject to adjustment for price at time of shipment, f.o.b. mill, with freight allowed to New York, Philadelphia or Baltimore. Prices, per 100 lb unless otherwise noted, are as follows:

Ingots, per gross ton	$47.39
Billets, blooms, slabs, rerolling quality, per gross ton	55.39
Billets, blooms, slabs, forging quality, per gross ton	65.39
Wire rods—in coils, per gross ton	72.64
Skelp	3.13
Plates	3.58
Floor plates	4.83
Structural shapes	3.33
Merchant bars	3.58
Reinforcing bars	3.43
Sheet piling	3.83
Hot-rolled sheets, 18 ga. & heavier	3.51
Hot-rolled sheets, 19 ga. & lighter	4.36
Cold-rolled sheets, 15 ga.	4.21
Galvanized sheets, plain, 10 ga.	4.38
Galvanized sheets, corrugated, 10 ga.	4.48
Hot-rolled strip	3.33
Cold-rolled strip	4.08
Tinplate—Coke 107 lb, base box	6.88
Bright nail wire	4.08
Black annealed wire	4.73
Galvanied plain wire	5.18
Galvanized barbed wire, Lyman 4 pt.-5 in., 80 rod spool	4.96
Galvanized barbed wire, Glidden 2 pt.-4 in., 80 rod spool	4.55
Wire nails	4.80
Bright staples	5.60
Galvanized staples	6.55
Standard rails—over 60 lb, per net ton	68.00
Light rails—60 lb and lighter, per net ton	72.35
Joint bars for standard rails	4.20
Tie plates	4.20

American Standard Pipe T&C	*Discount, Pct*
2½ & 3 in. black buttweld	52.7
2½ & 3 in. galvaniezd buttweld	38.2
3½ to 6 in. black seamless	47.7
3½ to 6 in. galvanized seamless	32.7
English Gas Tubes, T&C, 2½ & 3-in. buttweld	
Black	52
Galvanized	40.5

Westinghouse Sales Up Over Prewar Experience

Pittsburgh

• • • **Westinghouse Electric Corp.** has announced that orders received for the first 6 months of 1947 totaled $418,156,772. This figure is higher than the total for any entire prewar year and compares with $384,828,548 for the last 6 months of 1946.

Net income at Westinghouse for the first half of this year amounted to $21,735,442, equal to $1.59 a share of the company's common stock. This represented a return of approximately 7 pct on net sales billed during the period.

Unfilled orders as of June 30, 1947, totaled $673,496,915, compared with $449,633,226 a year ago.

Size of payroll and number of employees reached new peacetime highs. As of June 30, last, employees numbered 102,102. Payroll for the first half of this year was $159,967,464.

Three Civilian War Mobilization Agencies Forming in Washington

Will Draw Plan for Possible Mobilization of American Economy During War

o o o

By GEORGE BAKER
Washington Bureau

o o o

Washington

• • • **Three new civilian** war mobilization agencies, all dealing with industry's part in national defense, are due for early appearance on the already-crowded Washington scene.

Two of them—the Munitions Board and the Research and Development Board—will replace existing agencies, while the third—the National Security Resources Board—will come into being for the purpose of studying military-industrial-civilian mobilization as a collective problem.

All of these new agencies are authorized under the Army-Navy Unification Act — legislatively known as the "National Security Act of 1947"—which was recently signed by President Truman. Although the Republican-controlled Congress spent the best part of 6 months this year in paring down the war-time growth of Washington bureaucracy, both Senate and House felt the unification measure and its provision for new bureaus vital enough to future defense needs to pass the bill by voice vote.

The National Security Resources Board will consist of a $14,000-per-year civilian chief, and representatives of government departments, all appointed by the President. The board's duties are, in sum, to advise the President concerning coordination of military, industrial and civilian defense. Specifically, this means the following advice: Mobilization policies being followed, methods employed in utilization of natural and industrial resources, coordination among government agencies, relationship between supply and demand of manpower and resources, stockpiling and relocation of industries.

The Munitions Board is the old Joint Army-Navy Munitions Board under an abbreviated title and with a $14,000-per-year civilian head to be appointed by the President. Other members of the board are the under secretary or assistant secretary from each of the Departments of Army, Navy and Air Force.

The board's duties include the following: Coordination of Army-Navy-Air Force procurement, planning for the military aspects of industrial mobilization, assignment of procurement responsibilities to include standardization, preparation of production estimates as guides for logistics problems, determination of priorities in procurement, supervision of subordinate agencies, recommendations for changes in affected government agencies, maintenance of liaison with regard to procurement of critical materials and stockpiling of such materials and reviewing needs of the armed forces in relation to industrial capacity to produce.

The Research and Development Board carries on, in large part, the operations of the old Joint Research and Development Board. It too, will be headed by a $14,000-per-year civilian chief to be appointed by the President. Other members are two representatives each from the Army, Navy and Air Force Depts. Purpose of the board, under congressional mandate, is to "advise the Secretary of Defense as to the status of scientific research relative to the national security, and to assist him in assuring adequate provision for research and development on scientific problems relating to the national security."

Functions of the Research and Development Board include preparation of a research program for military purposes, advising the military on new trends, recommendations for research coordination among the military, formulation of policy for the military in connection with research outside the sphere of the military and consideration of research in its relation to military strategy.

Congressional doubts that all obstacles in the path of smooth relations between industry and the military can be removed by the new law are summed up by Rep. Clare Hoffman, R., Mich., whose Committee on Expenditures in the Executive Depts. nevertheless recommended enactment of the bill after extensive hearings.

"The new law may permit procurement to move faster and easier, but I am sorry to say that I still have no faith in the ability of the Army or Navy to get production," Mr. Hoffman told THE IRON AGE last week. "The services talk production and draw pretty diagrams about how they think procurement and production will work under the new law, but lack the basic understanding of industrial problems."

Mr. Hoffman sought unsuccessfully during Capitol Hill debate on the unification bill to amend the language of the measure to permit the Army and Navy simply to turn over their requirements to industry in order to get the full benefit of skilled engineering and business experience. "Army and Navy officers just can't resist the temptation to order people around,," as Mr. Hoffman sees it. "They want to tell industry where to get machines and how to hire and how to run the plants. But they lack any basic understanding of the way American industry operates. They just don't know, and can't be expected to know."

Success in military procurement and production has just one chance of success under the new law, Mr. Hoffman believes. And that chance lies in the willingness of the Army and Navy to tell business in general terms what they want and let industry go ahead and produce it. Creation of the new boards may result, as Mr. Hoffman fears, in a case of too many cooks. It's up to the military leaders to prove him wrong.

Multiple Tenants Solicited

Washington

• • • **Multiple tenants** who will sign one-to-four year leases for portions of the $14 million Boeing plant at Renton, Wash., are being sought by WAA. About 400,000 sq ft are immediately available and an additional 1,500,000 sq ft will be vacated by the Army and Navy in the future.

Weekly Gallup Polls . . .

Favor Separate Peace With Japan if Russia Can't Agree

Princeton, N. J.

• • • **Should the United States** go ahead without Russia and draw up a separate peace with Japan?

Public opinion in the United States was ready to endorse such a move even before the Russians recently refused to join the proposed 11-nation Japanese peace conference, according to George Gallup, director, American Institute of Public Opinion.

Early in July the institute questioned American voters on the issue as folows:

"Some people say that if Russia and the United States cannot agree on peace terms for Germany and Japan, the United States should go ahead without Russia and make a separate peace with these two countries. Do you approve or disapprove of this idea?"

The vote:

	Pct.
Yes	56
No	25
No opinion	19

In the case of Germany a separate peace would be difficult if not impossible to draw up, since Germany is divided into occupation zones. But such difficulties are not present in the case of Japan.

The poll results mark what may be the beginning of a new trend of public thinking in this country regarding Russia.

Heretofore most Americans although irritated by Russian actions have wanted to keep on trying to get Russia to cooperate. That mood is still present but apparently to a lesser extent. The majority in favor of a separate peace is substantial.

As recently as last May the public was in a mood to keep on exhausting every effort to get Russian cooperation. Three months later, after the Marshall Plan was made public, an institute survey found a very substantial majority of American voters in favor of going ahead with the plan even if Russia refused to take part.

In short, there is some evidence to show that American impatience with Russia may have reached the point where a majority want to see the nation embark on a course in foreign affairs more independent of Russia than heretofore.

The separate peace idea has wide backing from the rank and file of voters in both major political parties. Democrats favor it 2 to 1, Republicans 3 to 1, as the following table indicates.

	Yes Pct.	No Pct.	No Opinion Pct.
Democrats	54	27	19
Republicans	61	21	18

The reaction according to amount of education is as follows:

	Yes Pct.	No Pct.	No Opinion Pct.
College	53	35	12
High School	55	30	15
Grade or no school	58	19	23

•

• • • **Opinion in Great Britain** and the United States is pulling in opposite directions on the question of government's role in the nation's economic life.

Two conflicting philosophies are involved. One holds that the important job of government is to guarantee jobs and provide security. That is the general philosophy of a majority of British voters today under the labor regime.

The other philosophy holds that government should assist private enterprise by simply making sure that there are opportunities for people to get ahead on their own. The weight of public opinion in America is on the side of that philosophy, although a sizable segment want to have the government guarantee minimum standards.

To determine the course which voters in both countries like best the British and American Institutes of Public Opinion polled representative cross sections in their respective countries. Respondents were asked,

"Which one of these statements do you most agree with?" They were handed a card which read:

(A) The most important job for the government is to make it certain that there are good opportunities for each person to get ahead on his own.

(B) The most important job for the government is to guarantee every person a decent and steady job.

Americans and British Differ On Part Government Should Play In Creating Economic Security

o o o

The national results were:

	U. S. Pct.	Britain Pct.
Make opportunities	50	40
Guarantee jobs	43	55
No opinion	7	5

In both countries preference for a straight private enterprise system was found to be highest among the professional, business and white collar groupings. Approximately 60 pct of these groups oppose government-controlled minimum standards compared to less than 40 pct among wage earners.

As a general rule, a smaller percentage of every group in England's population would limit the role of government than is the case in this country.

As might be expected, 72 pct of Labor Party voters in Great Britain express confidence in the opposite policy — guaranteeing of jobs — against 35 pct among the Conservative and National Liberal voters.

As reported in May, the American Institute found 50 pct of Democratic voters in favor of guaranteed jobs and only 35 pct of Republicans.

Women in both countries are more inclined than men to go along with the theory that government should guarantee jobs.

The difference in attitude among citizens of the two great Western democracies may be explained partially by the economic distress under which the British labored even before the war.

The desire of a large number of English voters to have their government assume a larger part in business life has revealed itself in previous British Institute polls. A majority of respondents, for example, have approved the nationalization of railways, land and

(CONTINUED ON PAGE 144)

Industrial Briefs . . .

• INCORPORATES — The formation of Brooks & Perkins, Inc. has been announced. This new Michigan corporation has acquired, and will continue, the business of the former Brooks & Perkins, a partnership, fabricators of magnesium parts and products. E. Howard Perkins will be president.

• CHANGES NAME—The Whitewater (Wis.) Centrifugal Casting Co. has changed its name to Wisconsin Centrifugal Foundry, Inc., according to M. E. Nevins, president.

• OPENS SOUTHERN OUTLET—L. B. Foster Co. has opened offices and warehouses in Houston for prompt shipment of steel products. Jerome B. Strauss is manager, with offices in the Electric Bldg., 1016 Walker Ave.

• $10 MILLION PROGRAM—Construction operations on a $10,835,000 modernization program for the A. E. Staley Mfg. Co. have been announced. The goal of the program is to make the plant the most efficient in the industry.

• AFFILIATION — Farrel-Birmingham Co., Inc., Ansonia, Conn., manufacturers of heavy industrial equipment, gears and gear units, announces an arrangement with John Bertram & Sons Co., Ltd., Dundas, Ontario, by which Farrel-Birmingham processing equipment for the manufacture of rubber and plastics, phonograph record machinery, rolling mill machinery and hydraulic machinery will be built in Canada.

• BUYS WIRE COMPANY—A. J. Fazio, formerly associated with the Braeburn Alloy Steel Co. for 10 years, has purchased all of the outstanding stock of the Diamond Wire Spring Co., Pittsburgh. The company manufactures coiled springs and wire parts and are now contemplating some expansion in the metal line.

• ANNIVERSARY—The 60th anniversary of his entrance into the chain industry was celebrated at a testimonial dinner, by Eli Round, Fire Weld Supt. and member of the board of directors of The Cleveland Chain & Mfg. Co., Cleveland.

• NEW CANADIAN PLANT—The DeVilbiss Co., Toledo, will soon break ground for the first unit of its new Canadian plant. The new structure will be devoted entirely to the manufacture of spray painting exhaust systems and will enable the production of numerous new spray booth developments.

• SCIENTIFIC INSTRUMENTS — Milton B. Kantor and Jerry Hayman have formed the Andrew Technical Service to deal in scientific instruments. Mr. Kantor was formerly sales promotion manager of Precision Scientific Instrument Co. and Mr. Hayman was associated with Burton Mfg. Co.

• MERGER—M. A. Hanna Co. has announced that Evergreen Mines Co., Crosby, Minn., in which M. A. Hanna Co. acquired a substantial stock interest about two and one half years ago, has been merged into Hanna Coal & Ore Corp., operating subsidiary for its iron ore, docks, vessel, and lake coal business.

• NEW PLANT—In order to meet the increased demand in Dayton and surrounding areas for acetylene to be used in the oxy-acetylene welding and cutting process, the Air Reduction Sales Co. has opened a new acetylene plant in Dayton.

• NEW SCRAP FIRM—The formation of Producers Steel Trading Corp. in Cincinnati has been announced. The company will engage in the brokerage of iron and steel scrap to steel consumers in the middle west. A. Byer, head of The American Compressed Steel Corp., is president of the new company.

Canterbury Officials Claim Scrap Deal Is Legitimate Business

Washington

• • • **The War Dept.** has suspended shipment of 147,379 tons of ferrous scrap purchased by the Canterbury Steel Corp. in the American zone of Germany. Prodded by industry officials, who felt that this scrap was not to be returned to the United States due to rather odd shipping specifications, the Army stopped all shipments and gave Canterbury until Sept. 1 to clarify the situation.

It has also been revealed that Canterbury is a new company organized by a number of World War II veterans who are new to the scrap business. Due to the fact that Canterbury ordered the scrap, scattered throughout the American zone of Germany in more than 35 locations, shipped to the Brenner Pass for shipment to Turin, Italy, there has been considerable doubt here that the scrap would ever reach the United States as required by Army contract.

The scrap was sold to Canterbury on May 10 for an average price of $7.56 a ton and the Army has received a draft for $1,113,000. The scrap is unprepared (wrecked vehicles, tanks, etc.) and until the suspension order was issued, was being shipped by the Army to a central location prior to delivery to the Brenner Pass. The Army is obligated to deliver all scrap sold in Germany to any point on the German border designated by the purchaser.

Canterbury officials have told the Army that their reason for shipping the scrap to Italy is due to more favorable labor conditions in that country and the existence of a tie-up with Fiat for preparing the scrap prior to shipment to this country.

Assembly Plant for Sale

Washington

• • • **Curtiss - Wright's** assembly plant at Kenmore, N. Y., has been offered for sale or lease by WAA. Included in the offering is the land site of 23 acres and six major buildings containing about 340,000 sq ft of space.

Army and Navy Plan New Deals on War Plants, Machine Tools

Washington

• • • **Army and Navy Dept.** officials are preparing to expand negotiations with industry for continued operation, under Government leases, of 80-odd war-built plants and some 92,000 machine tools.

Authority for entering into leases of 5 years or longer was conferred upon the departments last week with presidential signature of the bill (S 1198) introduced by Senator Gurney, R., S. D., and backed by both Army and Navy Depts. Previous statutory authority for such transfers limited leases to 5-year periods, required that leases be made revocable at any time, and did not require the lessee to maintain property.

The new law will not result immediately in any large number of properties being offered for lease by either department, since almost all of the plants are now being operated by the original war contractors in production of munitions or civilian goods. The important angle of the bill, as far as the Government is concerned, is that a major step has been taken toward preservation of the nation's munitions reserve. And by requiring lessees to make the fewest number of changes in plant and equipment, the armed services feel that they are closer to their goal of 1-year conversion in the event of another national emergency.

In general, the Government now will require lessees to undertake the minimum degree of plant conversion, consistent with economic feasibility of such leases. The Army and Navy will endeavor to lease shell-making plants to tool manufacturers; for example, war chemical-producing plants to insecticide manufacturers, and the like.

Military munitions experts stand firm in their estimates that the nation's maximum conversion period in the future can be no longer than 1 year. Military scientists say that conversion, in the event of another national emergency, will have to be completed in a matter of months, at the most.

New Law Permits Long Leases On War Plants; Extends Machine Tool Date

o o o

Leases for the 80-odd plants now being held available on standby basis will proceed as rapidly as terms can be agreed upon by industry and the Army and Navy. Only about a dozen of these plants are being offered for lease at present. The remaining plants will continue operating as they have since the war, with leases being redrawn or modified to fit provisions of the new law.

Of those now offered for lease, those found by industry to be impracticable or uneconomical for private operation will be laid up intact by the Army or the Navy. But the services will endeavor to keep their plants in good condition by contractural upkeep provided in the leases to be negotiated, rather than by simply laying them up. Multiple tenancy arrangements may be employed in the Government's effort to keep the maximum number of plants in operating condition.

All leases made under the new law are revocable in time of national emergency. Each lease, also, will contain a clause permitting revocation at any time, unless the Government determines that omission of such clause will promote the national defense or be in the public interest. This provision, Congress feels, will permit a current appraisal of the need for continued Government ownership, and if the plant is no longer needed in the standby program, leases could be revoked and the property declared surplus. Former prohibitions against lease of oil, mineral and phosphate lands are restated in the new law.

Equal opportunities will be granted "all known qualified manufacturers" prior to the awarding of any leases, according to Army and Navy officials. Such leases, the two combat arms state, "will usually be made to reliable manufacturers for the production of goods similar to those for which the plant would be utilized during a future mobilization, in preference to manufacturers who would utilize the facility to produce a wholly dissimilar product."

Another important feature of the new law deals with the Government's reserve of machine tools and production equipment. The Army and Navy propose to acquire and maintain in standby plants a reserve of such tools which are to be obtained out of existing surpluses. They will serve as a source of immediately available tools for emergency use in any part of industry requiring them for immediate expansion in the event of another national emergency.

The military recently had been straining to select its machine tools by June 30. Under the new law, February 1, 1948, is set as the deadline for issuing a list of the necessary 92,000 units. (THE IRON AGE, June 5, p. 150.)

"The machine-tool bottleneck was one of the most serious in the beginning of the present war emergency," the Army and Navy wrote Congress this year in support of the new law. "It is the intention of the departments that this limited strategic reserve of machine tools and production equipment should be available for immediate use in the production of those end items of war material needed to mobilize prior to the full conversion of industry to war production."

Puts Plant on Block

Washington

• • • **The sprawling** wartime Hughes Tool Co. plant at Houston, comprising 13 complete industrial areas, has been put on the block by the WAA with a request for bids for any or all of the units. Each unit is a separate industrial package with utility services, capable of being operated independently of the others. Bids will be received at the Houston regional office until 10 a.m. (CST), Aug. 25, 1947.

Carnegie-Illinois Changes Extras in Addition to Price Increases

Some Revisions Will Increase Cost to Consumer; Others Mean Lower Price

o o o

By D. I. BROWN
Chicago Regional Editor

o o o

Chicago

• • • **In addition** to the new base price increases on all steel products, certain changes in extras have now been made. Effective Aug. 1 Carnegie-Illinois Steel Corp. revised some of the extras on hot-rolled sheets, 18-gage and heavier, cold-rolled sheets and galvanized sheets. For the most part the changes in the extras are not major.

Some of the revisions will ultimately cost the consumer more money, while others will effect a reduction in final steel costs. Although additional extra changes will undoubtedly be made on other products, it is not believed the revisions will be broad enough to cause confusion similar to that which the industry went through early in the year when practically all extra charges on all products were drastically revised.

For the first time, the producers have established a minimum, maximum hardness to which they will work on hot-rolled sheets 18 gage and heavier. This minimum is Rockwell B 75. If a consumer wants any specified hardness lower than this limit the producers will only furnish the sheets as cold-rolled.

The extensometer testing extra has been changed to 10¢ cwt. This extra was formerly $10 a test. This particular change is in favor of the consumer who orders small quantities of sheets. In other words, the small plant can order up to 5 tons of sheets on a single item before the extensometer extra would exceed the former price of $10 a test. Large consumers of sheets, however, if their specifications require determination of yield strength, elastic limit, proportional limit or the equivalent, will pay more than they formerly did on the larger ordered tonnages.

Changes made in the chemical requirement extras for the most part are in favor of the consumer. The top carbon range has been widened to 0.60-1.05 pct carbon rather than stopping at 1.0 pct carbon as was formerly in effect. The extra charges for lower carbon ranges in the three breakdowns by gage, have not been changed. According to the producers, if carbon is specified over 1.05 the extra will then have to be secured upon application.

The changes in the silicon extras are somewhat more important. The former practice was to charge 10¢ cwt for a specified silicon 0.10 to 0.15, and 25¢ cwt for silicon specified 0.15 to 0.30. The new price card permits ordering silicon from 0.15 to 0.60 at but a 25¢ cwt extra. This concession on the part of the producer, however, still has restrictions. If the silicon is specified over 0.15 pct and the carbon under 0.15 pct the electrical sheet price extras will apply as was formerly the case.

Packaging extras have been further refined in the new price card issued by Carnegie-Illinois on hot-rolled sheets 18 gage and heavier. Eleven gage sheets up to 18 gage, not pickled, will be supplied shrouded or paper covered at no extra cost if the customer permits gondola car loading. However, if a consumer specifies any paper protection on sheets loaded in box cars, this practice now carries an extra of $1 a package. If a consumer does not specify paper wrapping, the mills will load the bare sheets in box cars at no extra. These same rules apply on coils except that a specification calling for paper wrapped coils on box car loading would be $2 a pack or car package.

Cold-rolled sheet extra changes follow a similar pattern to that on hot-rolled. The silicon range has been similarly broadened, the revision on extensometer testing is the same as cited on hot-rolled and the same rules apply on loading. However, a revision in the length extras have caused a reduction in price of some items. There is a 2½¢ cwt packaging reduction on cold-rolled sheets shipped in coils when shipped as lifts 1 ton or heavier on wooden skids with skeleton type platforms not over 4-in. high. This is an effort on the part of mills to get consumers to specify heavier coils.

The extra changes in galvanized sheets are much more extensive than those previously mentioned. Where there was formerly no extra charge for extra smooth galvanized sheets, there is now a 25¢ cwt assessment on all sizes and gages. In addition, galvanized sheets 2 to 6-in. wide, 29 to 32-gage on which the old cards did not make any special charges, are now covered by extras.

A new bracket of charges appears on the price card on galvanized material 1 to 1½-in. wide 15-gage and heavier. All told the new extras vary from $1 to $3 cwt, depending on gage and width. On galvanized sheets the thickness of coating extras have not been changed, but if the mill has to guarantee a precise thickness of a coating there is now a 10¢ cwt extra. This extra must be paid plus specified depth of coating extra. On packaging for box car or gondola loading the same extras apply as those previously mentioned on hot-rolled sheets.

Shear and Press Plant Being Sold to Operator

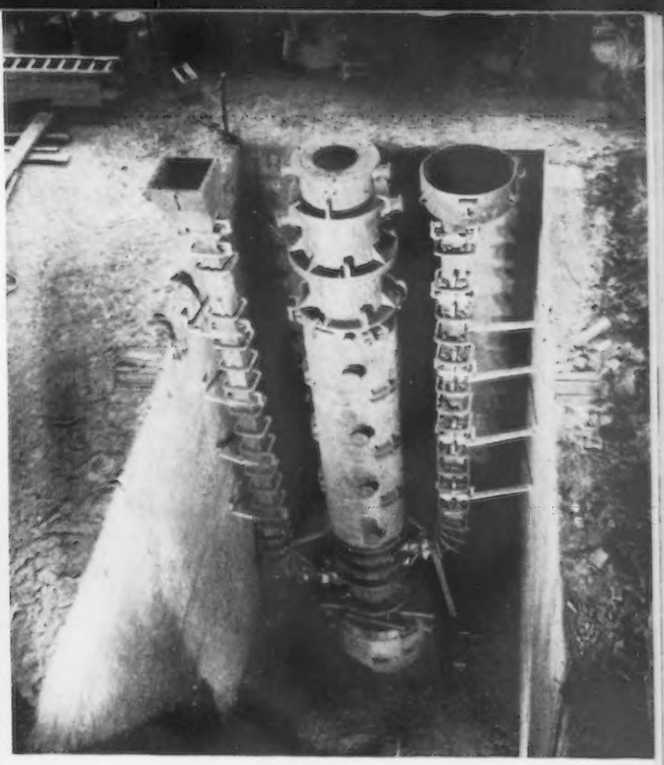
Washington

• • • **A heavy duty** shears and presses plant in Cincinnati, has been sold to the wartime operator, the Cincinnati Shaper Co., for $608,000, WAA has announced. Since the end of the war, the company has been producing heavy metalworking machines under an interim operating arrangement.

At the same time, WAA announced approval of the sale of Acrods Corp. welding rods plant, Pittsburg, Calif., to the Fram Corp., East Providence, R. I., for $116,000. Machinery and equipment was not included in the sale since the new owner will convert to manufacture of oil filters.

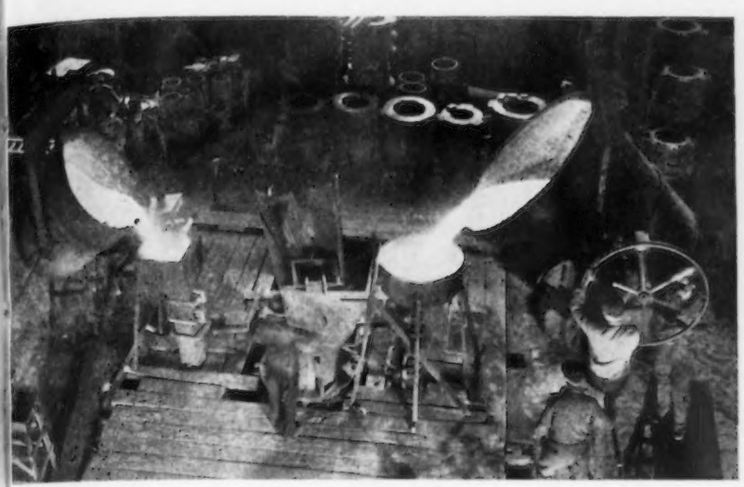
Bottom Pouring Steel Mill Rolls

• • Production of steel and iron rolls for rolling mills is a highly developed specialty incorporating many unusual casting and processing techniques. These pictures, made in the Mackintosh Hemphill plant in Pittsburgh, show several aspects of the bottom-pouring technique used by this old-line steel mill roll maker.



ABOVE

FIG. 1 • • This mold, for a large plate mill iron roll, is shown assembled and in the pit ready for pouring. The runners, through which the metal is poured, are on the outside of the mold in contrast to steel mill practice.

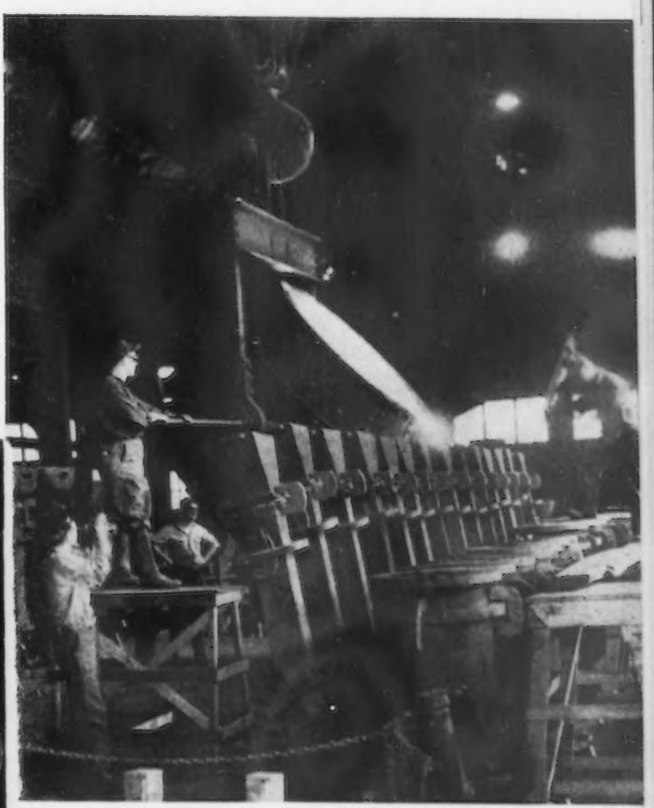


ABOVE

FIG. 2 • • The molten iron is poured into the two runners of the mold simultaneously. It is poured slowly at first until the level of the metal just covers the entering gates, then it is poured as rapidly as possible. For this reason, iron rolls are poured from the lip rather than through a nozzle in the bottom of the ladle. Chills in the mold speed cooling and increase the hardness of the roll surface. Pouring temperatures are carefully controlled, as they have a definite effect on roll quality.

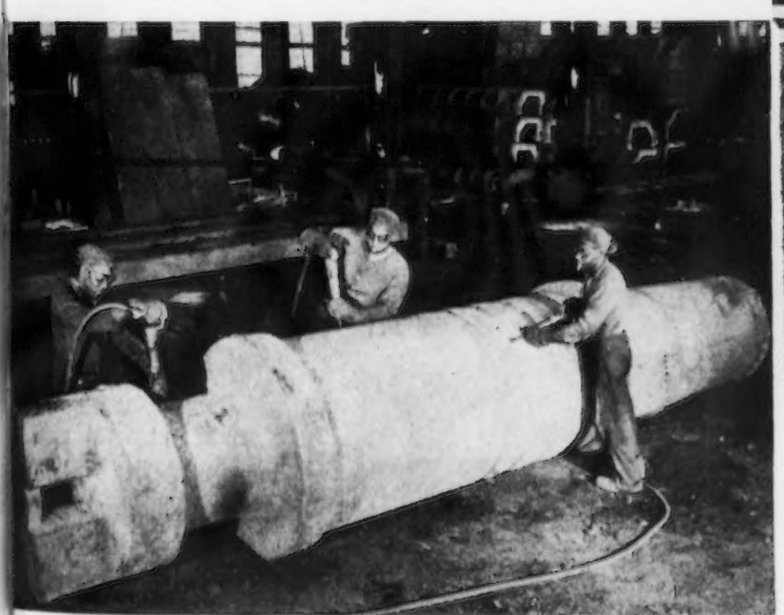
BELOW

FIG. 3 • • In contrast to the heavy plate mill rolls, these high alloy iron rolls are poured in banks. As with heavy rolls, they are bottom poured. With sand molds, bottom pouring eliminates the possibility of breaking down the mold and the swirling action of the metal entering the bottom of the mold keeps the metal clean and free from slag inclusions. Small rolls like these are used in mills rolling such items as rod, bars and small structural sections.



LEFT

FIG. 4 • • After solidification, the molds are broken away from the rolls, annealed, and then are ready for finishing. Prior to annealing, however, the roll is taken to the shipping floor where pneumatic hammers are used to chip the adhering sand from the surface of the mold, which is usual foundry practice.



Atomic Energy Commission Shipped 1000 Radioisotopes

College and Industrial Labs Among Buyers; Shipments Are Not Hazardous

o o o

Washington

• • • **More than 1000 shipments** of radioisotopes have emanated from the Clinton Laboratories, operated for the government by the Monsanto Chemical Co., during the first year of production, the Atomic Energy Commission announced on Aug. 3.

In its anniversary statement, the AEC also identified for the first time the academic institutions and industrial laboratories that have purchased radioactive tracers. However, the uses to which these institutions and firms are putting the isotopes are not revealed in full despite the fact that a few specific examples are given. AEC told THE IRON AGE that it did not believe it was within its province to reveal inside research problems of the nation's industrial labs. It was also pointed out that the mere release of the firms and institutions making purchases was a definite departure from past policy.

The Commission statement also revealed that the institution receiving the greatest variety of isotopes for its combined investigators was the Massachusetts Institute of Technology. Shipments have gone to approximately 170 institutions and researches in 92 locations scattered throughout the country.

The heaviest shipment was made during February 1947 when a 23-gram unit containing radioactive cobalt (Co 60) was shipped to the Bureau of Standards. The container, shielding the cobalt oxide which was equivalent in weight to a 50¢ piece, weighed 1600 lb. This isotope is being used by the Bureau to furnish radiation standards to research workers for calibration of radiation measuring instruments.

Special pile irradiated steel bearings furnished to M. I. T. for applied research on friction problems provide another interesting example. Actually, Dr. John T. Burwell, Jr., in charge of this particular research problem is attempting to determine what happens to metal during friction and wear.

"The active specimens will be employed in experiments on dry and lubricated friction phenomena to investigate the role that material transfer plays in these phenomena," Burwell states. "This is of importance in elucidating the fundamental mechanism of friction and it will also be employed in research at the M. I. T. to investigate the surface of layers developed on the piston rings and cylinder walls of well run-in aircraft engines."

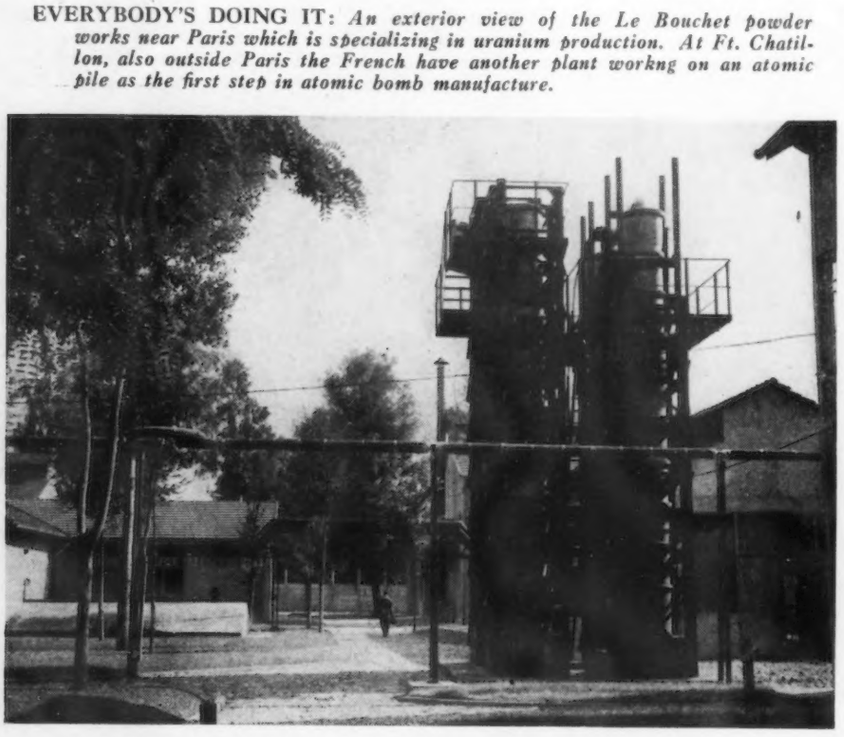
Tests at M. I. T. have shown that the tracer method makes it possible to detect as little as one hundred-billionth of an ounce of metal transferred from one surface to another by friction. This sensitivity is thousands of times greater than that of previous methods.

Metallurgists also are finding many uses for radioactive tracers. (THE IRON AGE, July 10, p. 108). They are studying such diversified problems as the aging of ferrous materials by following the diffusion of carbon atoms, the thermionic activity of filaments, and the absorption of gases in metals. Other fundamental problems confronting the research metallurgist which can be solved by radioactive tracers are related to oxidation, diffusion, vapor pressures, and the kinetics of reaction in solid alloys, such as age hardening, quenching, annealing and homogeneity of powder mixtures.

One of the major processes to be developed by the steel industry is a controlled method for removing sulfur from iron when the iron is separated from the slag. Before this can be accomplished the mechanism by which sulfur is distributed between slag and metal must be understood. Metallurgists are now in a position to study the reaction, since radioactive iron and sulfur tracers can be introduced into the process.

Scotching many wild rumors about the dangers involved in the transportation of radioactive materials, AEC also revealed in its report that shipments of radioisotopes from Oak Ridge, Tenn., to industrial and academic laboratories are now considered a relatively routine matter, provided a few simple precautions are taken. To date there have been no accidents in either shipping or handling these materials.

EVERYBODY'S DOING IT: *An exterior view of the Le Bouchet powder works near Paris which is specializing in uranium production. At Ft. Chatillon, also outside Paris the French have another plant workng on an atomic pile as the first step in atomic bomb manufacture.*



All shipments are now made by rail or air, however, regulations applying to motor trucks are being prepared by the Interstate Commerce Commission. Erroneously, it had been thought that special designed vehicles, using large amounts of heavy cadmium and lead shielding, would be required. An offer to build such a vehicle has been discouraged, since it was obviously unnecessary. In fact, standard vehicles are used to haul the radioisotopes containers from Oak Ridge to rail centers and airports.

The primary reason that extreme precautions are not necessary in the hauling of radioisotope tracers is that these materials are not fissionable as is the case in regard to the bomb materials uranium and plutonium.

The job was made easier by the existence of rules applying to rail transportation of radium. Radium, a naturally radioactive element, has been handled successfully by the Railway Express Co. Actually radium gives off much more energy, in the form of gamma rays, than most of the isotopes which are presently being shipped from Oak Ridge.

Labeling, marking and packing requirements are similar to those used for radium and each label shows the equivalent radium content of the radioactive material in the shipment.

However, in the case of certain radioisotopes, Carbon 14 for instance, the equivalent of radium is zero, the elements emit no gamma rays and require no lead shielding. These materials are radioactive in that they emit beta rays or alpha particles but these are completely shielded by a wood, glass or light metal container. The out-dated regulations require a minimum of one-fourth inch of lead around any substance marked "radium" or "radioactive." The added weight of the lead shielding is not necessary in such cases as Carbon 14 and places an unfair burden on the institution paying the shipping charges as well as the extra expense of manufacturing lead containers. Proposed rules now underway will eliminate this and other inconsistencies.

In general, specially constructed containers are used ranging in weight from less than a pound to a ton—the amount of shielding varying with the amount of energy of radiation. The average container weighs between 100 and 150 lb, with the thickness of lead shielding varying from ½ in. up, depending on the amount shipped.

The radioactive material is first placed in a glass bottle which is inserted in an air-tight stainless steel cylinder. The cylinder, in turn is placed inside a lead shield which is supported firmly inside a strong wooden box. Complete directions for opening the lead shield are placed inside the box which is then sealed for shipment. The box is finally checked with radiation instruments to determine the amount of radiation at the surface. Should this prove to be above tolerance, the substance is repacked with a thicker shield.

At present, shipments are actually packaged under more stringent specifications that required by existing rules, due to the fact that the employees of the laboratories are working constantly with large quantities of radioactive material and are naturally more careful.

It has been the experience of the Isotopes Branch of AEC that the most practical method of shipping and handling radioactive materials is in small lots. Each lot is packed in a container with a lead lining of sufficient thickness to shield persons or sensitive undeveloped film (the only merchandise which can be effected) from gamma radiation. The only provision necessary is that the package or container not be maintained for long periods in proximity to undeveloped film or persons. The material is also packaged with a fire-proof, break-proof inner container so that under no conditions of handling or accident can the radioactive material escape from its container.

While the railroads had a precedent for transportation of radioactive isotopes and experience in handling radium, the air lines were not so fortunate. Nevertheless, they immediately established emergency rules and air transport has proved most satisfactory. However, before the airlines could accept shipments, certain questions had to be answered. Would radioactive materials affect delicate aircraft instruments or radio communication? Was there danger to passengers or crew, and would cargo be damaged? The answers from Oak Ridge were prompt. Radioactive materials emit only gamma and beta rays and alpha particles which have no effect upon radios or aircraft instruments. Lead shielding of materials emitting gamma rays affords adequate protection to personnel and undeveloped film. In fact, AEC scientists state that the radiation intensity at the surface of an isotope container is approximately the same as that at the radium dial of a pilot's wrist watch.

BATHTUBS INSTEAD OF SAUCERS: *Air freight cargo flown out of Detroit last week included 60 bathtubs and 40 lavatories shipped by Briggs Mfg. Co. Plumbing Ware Div. to Austin, Tex. The entire shipment was handled by a C-46 Commando flown by Slick Airways of San Antonio, Tex. The shipment which reached Texas in 6 hr represented approximately half a railroad freight car shipment.*

Steel Deliveries Glut Car Builders' Plants But Production Is Low

Washington

• • • **More steel was** delivered to the railroad car building industry from March through June of this year than the car builders could use, steel producers disclosed at a Capitol Hill conference last week.

Answering complaints of railroads and car builders that the goal of 10,000 new freight cars per month could not be reached because of the builders' inability to get sufficient steel, the producers told a conference called by Senator Reed, R., Kans., that they delivered an average 202,592 tons per month during March, April, May and June.

Senator Reed points out that it takes about 164,000 tons to build, maintain and repair 7000 cars per month. These are the builders' figures, he says. And since the car builders and railroads have not yet approached the 6000 car mark in any month this year, the builders are unjustified in pointing the finger at the steel industry, according to the producers.

The goal of 10,000 cars per month will be reached in September, Senator Reed states. "I am confident that we will reach the 10,000 mark in September and maintain the level of production thereafter. The main problem is unbalanced inventories, and that's something that time will work out," he said following last week's industry conference. Sheets, plates and bars are the most critically short items, he believes.

Railroads now have about 111,000 cars on order and plan to order about 30,000 more, Senator Reed's figures show. Exports of freight cars, which took a disproportionately large share of 26,569 cars in the first 6 months of 1947, have now been stopped, he says. Car retirements in the first half of this year offset the 21,757 units built in the same period for the domestic market.

Steel producers present at the closed conference included the following, according to Senator Reed: Republic Steel Corp.; Jones & Laughlin Steel Corp; Wheeling Steel Corp.; The Youngstown Sheet & Tube Co.; The National Steel Co.; Worth Steel Co.; Inland Steel Co.; Lukens Steel Co.; Bethlehem Steel Co.; U. S. Steel Corp., and American Rolling Mill Co.

Report on U. S. Export Potential Scheduled For October Finish

Washington

• • • **After a 2-day** organizational session, the committee named by the White House to study America's export potential as a means of implementing the Marshall Plan has begun its studies in seven different fields.

Seven subcommittees will study individual problems and come up with a report to President Truman by Oct. 1. This report will accompany one from Interior Secretary J. A. Krug on natural resources and another on the overall economic situation from the Council of Economic Advisers, headed by Edwin G. Nourse.

These studies will cover such problems as what can be done to increase domestic output of material needed in Europe and the need for possible restrictions on domestic consumption.

The seven subcommittees and the fields they will cover are as follows:

Capital and Durable Goods: Hiland Batcheller, Allegheny-Ludlum Steel Corp., chairman; James B. Carey, secretary-treasurer of the CIO; Paul G. Hoffman, president of the Studebaker Corp., and Harold G. Moulton, president, Brookings Institution.

Consumer Goods: John L. Collyer, president, B. F. Goodrich Co., chairman; R. R. Deupree, president Procter & Gamble Co.; Calvin B. Hoover, dean of graduate school, Duke University, and Robert E. Buchanan, dean of graduate college, Iowa State College.

Food Resources: Chester C. Davis, president, Federal Reserve Bank, St. Louis, chairman; Robert E. Buchanan, William I. Myers, dean of the college of agriculture, Cornell University, and Robert G. Sproud, president of the University of California.

Manpower: Paul G. Hoffman, chairman; James B. Carey, George Meany, secretary-treasurer, AFL, and Robert M. La Follette.

Mineral Resources: Robert Koenig, president Ayrshire Collieries Co., Indianapolis, chairman; Melville F. Coolbaugh, Golden, Colo.; R. R. Deupree, and George Meany.

Transportation: Granville Conway, The Cosmopolitan Shipping Co., chairman; James B. Carey, Robert Koenig and Edward S. Mason, dean, school of public administration, Harvard University.

Coming Events

Aug. 25-29 National Assn. of Power Engineers, Inc., Boston.
Sept. 1-4 American Society of Mechanical Engineers, fall meeting, Salt Lake City.
Sept. 8-12 Instrument Society of America, conference, Chicago.
Sept. 17-26 National Machine Tool Builders' Assn., machine tool show, Dodge-Chicago Plant, Chicago.
Sept. 18-20 Foundry Equipment Manufacturers Assn., annual meeting, Hot Springs, Va.
Sept. 18-20 National Assn. of Foremen, annual convention, Los Angeles.
Sept. 22-25 Assn. of Iron & Steel Engineers, annual meeting, Pittsburgh.
Sept. 29-Oct. 3 American Gas Assn., San Francisco.
Oct. 2-3 Gray Iron Founders' Society, annual convention, Milwaukee.
Oct. 6-7 Packaging Machinery Manufacturers Institute, annual meeting, Springfield.
Oct. 9-10 Porcelain Enamel Institute, annual meeting, Cleveland.
Oct. 16-17 National Conference on Industrial Hydraulics (formerly Hydraulics Machinery Conference), annual meeting, Chicago.
Oct. 18-24 National Metal Exposition. Chicago.
Oct. 30-Nov. 1 American Society of Tool Engineers, semiannual meeting, Boston.
Oct. 31 Illinois Mining Institute, annual meeting, Springfield, Ill.
Nov. 7-8 Annual Conference on X-Ray and Electron Diffraction, Mellon Institute of Industrial Research, Pittsburgh.

Construction Steel . . .

• • • **Fabricated steel awards** this week included the following:

2000 Tons, gates for Lock 27, Mississippi River, to American Bridge Co., Pittsburgh.

1865 Tons, Martinsville, Ind., White River generating station, for Indianapolis Power & Light Co. to J. T. Ryerson & Son, Chicago.

1100 Tons, Clarence, N. Y., National Gypsum Co., two plant buildings, Siegfried Construction Co., general contractor, to Ernst Iron Works, Inc., Buffalo.

840 Tons, Chicago, 83rd St. grade separation to Bethlehem Steel Co., Bethlehem.

260 Tons, Philadelphia, General Motors Coach & Truck Div. plant, to Bethlehem Steel Co., Bethlehem.

260 Tons, Newark, N. J., New Jersey Dept. of Highways, Route 25—section 34-B, through Colyn Construction Co., to Bethlehem Steel Co., Bethlehem.

250 Tons, Los Angeles, service station for GMC to Pacific Iron & Steel Co., Los Angeles.

200 Tons, Perryville, Md., Pennsylvania R.R. Co., Bridge, to Belmont Iron Works, Philadelphia.

180 Tons, Chicago, building for E. E. Mills Corp. to Wendnagle & Co., Chicago.

140 Tons, St. Paul, pulp building through Midwest Engineering Co. to St. Paul Foundry Co., St. Paul.

140 Tons, Chicago, building for University of Chicago, to Wendnagle & Co., Chicago.

• • • **Fabricated steel inquiries** this week included the following:

900 Tons, Lancaster, Pa., Armstrong Cork Co., research laboratory, due Aug. 15.

700 Tons, Chicago, diesel shop for Chicago & Northwestern R.R.

655 Tons, Mossdale, Calif., bridge across San Joaquin River, California Div. of Highways, Sacramento, bids to Aug. 27.

350 Tons, Nesquehoning, Pa., Bundy Tubing Co., plant, due Aug. 5.

300 Tons, Plymouth Meeting, Pa., E. J. Lavino Co., addition to plant, due Aug. 5.

• • • **Reinforcing bar awards** this week included the following:

1000 Tons, Bellview, Neb., power station through Bates & Rogers to J. T. Ryerson & Son, Chicago.

355 Tons, Chicago, 83rd St. grade separation, Ready Coal & Construction Co. previously reported low bidder. M. J. McDermott Construction Co., Chicago, has the contract.

• • • **Reinforcing bar inquiries** this week included the following:

205 Tons, Pleasant Grove, Utah, bars for Provo River Project, Bureau of Reclamation, Denver.

100 Tons, Sacramento, Calif., Sutter-Butte Canal headgate on west levee Feather River, Sacramento District, Corps of Engineers, Spec. 1259.

• • • **Sheet piling awards** this week included the following:

5700 Tons, Lock 27, Mississippi River, to Carnegie-Illinois Steel Co., Pittsburgh.

600 Tons, Keewanah Waters Works, Mich., through U. S. Engineers to Carnegie-Illinois Steel Corp., Pittsburgh.

• • • **Railroad car awards** this week included the following:

Eleven 2000-hp Diesel passenger locomotives have been ordered by the Nickel Plate Road from American Locomotive Co., New York.

Auto Workers Union Instructing Locals To Sidestep the Act

Detroit

• • • **The UAW-CIO** auto workers union is instructing all its locals to (a) insert a clause in their contracts stating that the union is not liable for contract violations, (b) remove "no-strike" clauses from its present contracts, and (c) extend union shop or maintenance of membership agreements. Locals are also being instructed to commence negotiations immediately for new check-off agreements.

In a resolution recently passed the International Executive Board voted to refrain from calling on the new National Labor Relations Board for any assistance whatsoever.

According to the instructions being sent to locals by the UAW-CIO Executive Board, a strike instituted before Aug. 22, 1947, without any notice on the Taft-Hartley Act does not violate the Act.

The following clause has been suggested in dealing with liability for contract violations:

"It is understood and agreed that in the event of any alleged violation of this contract, there shall be no liability on the part of the International Union, Local Union or any of their officers, agents or members, and the sole recourse and exclusive remedies of the employer in such event shall be those that are specifically provided for in this agreement."

Specifically, the union is telling its members that in negotiating new contracts, renewals, extensions, modifications, etc. (a) you should insist on the inclusion of the clause dealing with liability for contract violations; (b) you should insist that if the contract is to provide for wage reopening during its term, there must be a clause by which the employer recognizes that in the event of failure to agree on the wage issue, a strike shall not be deemed to be a violation of the contract.

As a part of every strike settlement, locals are instructed to insist that the company agree in writing to release and relinquish any and all claims for damages which it may have against the union and/or its members arising out of the contract.

o o o

STEEL HOOPLA: *The steel framework of the Dry Coulee siphon of the Columbia River basin project will form the ribs of a 2-ft thick concrete tube with an 84 ft circumference. This siphon will benefit over one quarter of the million acres affected by the project.*

o o o

MACHINE TOOLS

. . . News and Market Activities

Automotive Tooling Orders Provide Sudden Burst of Activity

• • • **While orders for** tooling for the new Chevrolet plant in Cleveland were in the process of being reinstated this week, according to reliable sources in the trade, fewer new firm orders were reported in most sectors.

In Detroit, there is much talk about the machine tool show which is expected to give the industry what one source describes as a "shot in both arms." Meanwhile, the standard tool industry has settled down after a brief flurry occasioned by recent upward price adjustments.

At the moment, many suppliers of special machine tool equipment are being swamped with inquiries from the auto industry; the race to get orders placed and thus insure the earliest delivery possible has kept estimators busy and the present feeling is that this urging to get orders placed will continue for some time to come.

Present indications are that two independent auto producers, Hudson and Nash, will definitely introduce their postwar models before the end of 1947. In the meantime, the hustle of other producers is believed to be reflected to a considerable extent in the present burst of activity in the machine tool industry.

In Cincinnati, reasons for declining demand for machine tools vary, but reliable sources allege that customers are apathetic toward new capital purchases at this time. There is little doubt in informed circles that War Assets Administration offerings have caused the loss of bookings in local plants, but a number of buyers of WAA equipment buy only on a price basis and in all probability would not buy at all except for the low government prices.

According to a number of users, the Machine Tool Show will be a stimulus to further bookings. In the meantime, some business is coming in, but not in sufficient quantity to warrant a high production rate. Despite this, optimism is strong in the trade for a revival in the fall and manufacturers are stretching a point here and there to maintain plant forces. Job work is being done and current demand is about evenly divided between domestic and foreign users.

New Hudson and Nash Models Appear to Be Scheduled For the End of 1947

o o o

Foreign buyers are still very much in the market, but financial limitations are retarding ordering to a considerable extent. Domestic buyers, at this point, are of course interested primarily in the new features which will be incorporated in the machines displayed at the show. The influence of electronics is expected to be marked, with new controls, variable speeds and new devices to maintain constant surface speeds. A planer manufacturer will show special hi-speed antifriction table tracks for cutting carbide tools.

In the East, dealers are pessimistic. There are plenty of inquiries, but each inquiry requires much refiguring of costs by dealers and the lapse of several months before resulting in any positive action, a situation differing noticeably from midwestern dealers, where inquiries often result in orders within a few weeks' time.

According to reliable sources among the dealers, deliveries on standard tools range from 3 to 6 weeks, but changes required in standard controls may vary up to 6 months for delivery. Some purchasers now prefer to wait until the show, or until the show lines are available at least, before placing an order.

Elsewhere in the East, many segments of the trade report that no new business has developed in the past 2 weeks, and that many users who have asked for quotations have lost all interest. Most producers, however, are confident that good business will follow the machine tool show.

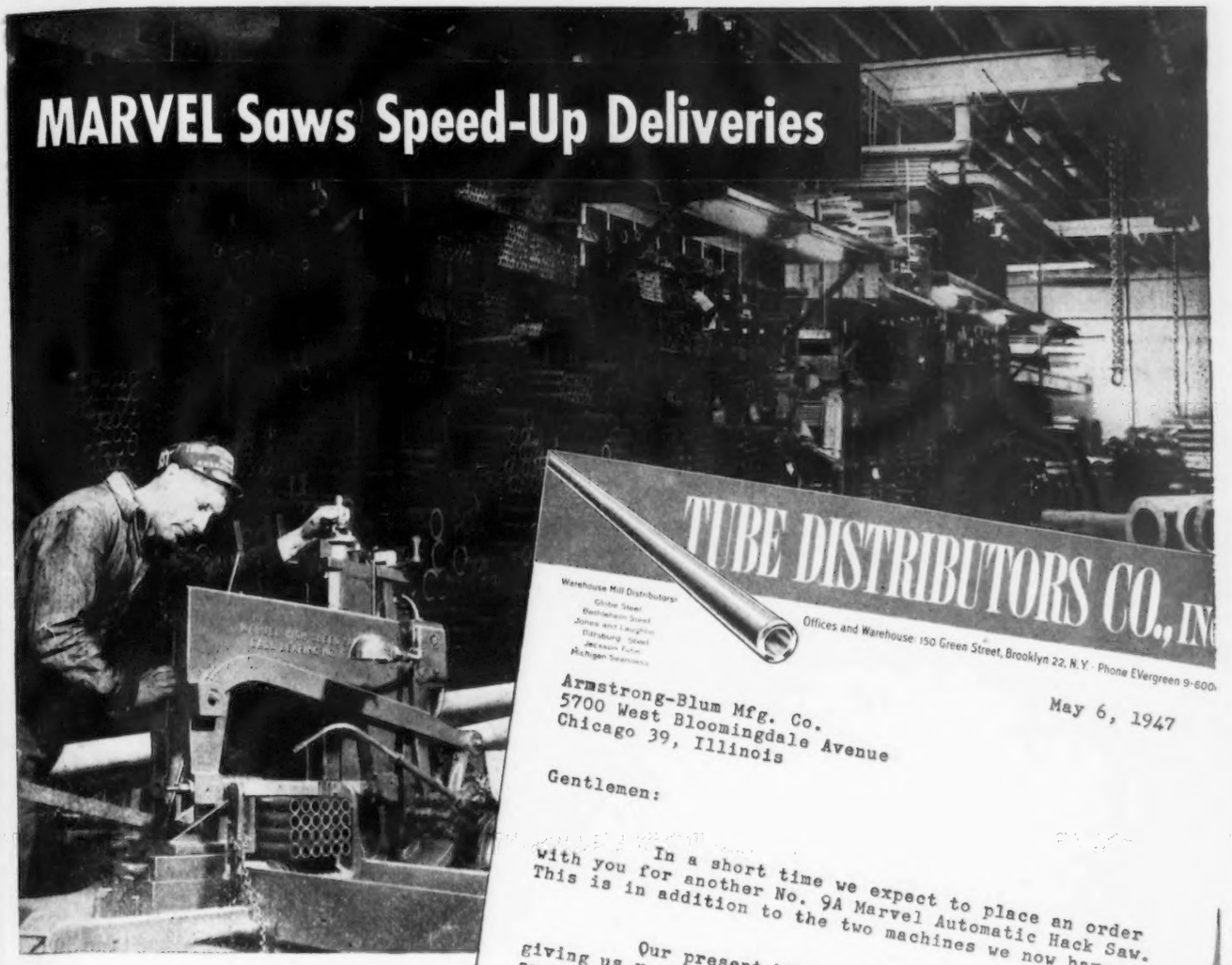
Russell, Burdsall & Ward Bolt & Nut Co. has placed orders for more than $2 million worth of new machinery in the $5 million 5-year expansion program. Other immediate equipment expenditures for additional machinery for which prices and delivery dates are now being weighed, will amount to more than $500,000 over and above present commitments. These include primary types of nut and bolt making machines and the necessary threading, trimming and heat treating equipment. At the Port Chester, N. Y., plant, about $882,000 will be spent for nut and bolt making machines, secondary operations and some new machine tools; Coraopolis, Pa., $733,000 for buildings and machinery; Rock Falls, Ill., $721,000 for new buildings to cost $110,000 and machine tools, heat treating equipment, headers and secondary equipment; and at Los Angeles, $605,000, including $120,000 for new buildings, and the balance for machine tools, headers and other equipment.

In Washington, WAA has said that it may extend $122,255,000 in credits to seven foreign countries to buy surplus property in the U. S. WAA Chief Robert M. Littlejohn said special attention was being given to the development of export markets as an aid to the disposal of domestic surplus property.

Mr. Littlejohn was quoted as saying: "The sale of certain types of surplus property is beginning to compete with domestic output. Some manufacturers have objected to this competition and certain of them have recommended increased efforts to dispose of surplus in the export markets."

This will hardly come as news to the machine tool industry, which for some time has been wondering when it will ever hear the end of the surplus.

MARVEL Saws Speed-Up Deliveries



TUBE DISTRIBUTORS CO., IN

Warehouse Mill Distributors:
Globe Steel
Bethlehem Steel
Jones and Laughlin
Ryerson Steel
Jackson Tube
Michigan Seamless

Offices and Warehouse: 150 Green Street, Brooklyn 22, N.Y. · Phone EVergreen 9-600

Armstrong-Blum Mfg. Co.
5700 West Bloomingdale Avenue
Chicago 39, Illinois

May 6, 1947

Gentlemen:

In a short time we expect to place an order with you for another No. 9A Marvel Automatic Hack Saw. This is in addition to the two machines we now have.

Our present Marvel Automatic Hack Saws are giving us very satisfactory service, enabling us to speed cutting of mechanical and boiler tubes to our customers' required lengths at a minimum of cost, both for labor and blades.

Your service and attention to our requirements have been very satisfactory.

Sincerely,

TUBE DISTRIBUTORS CO., INC.

AFL:CB

Superintendent

Steel warehouses and stockrooms deliver cut-off lengths in any quantity FASTER—BETTER—CHEAPER when equipped with MARVEL 6A and 9A Automatic Hack Saws. Far faster, floor to floor, than any other hack saws, they save valuable machine hours by reducing cutting-off time to a fraction—save other machining hours by producing accurately cut pieces of exact length.

There is a MARVEL Saw for every need—in every capacity range and price class. Your local MARVEL Sawing Engineer will gladly study your metal sawing problems and requirements and make recommendations as to methods and equipment.

1947 MACHINE TOOL SHOW
CHICAGO SEPT 17-26

Metal Cutting
MARVEL SAWS
Better Machines—Better Blades

ARMSTRONG-BLUM MFG. COMPANY

"The Hack Saw People"

5700 BLOOMINGDALE AVENUE — CHICAGO 39, U. S. A.

NONFERROUS METALS

. . . News and Market Activities

Copper

• • • **Confidence was** reestablished in the possibility of uninterrupted domestic copper production with the news that Kennecott Copper Co. had concluded a wage agreement with the Smelter Workers' Union specifying a wage rise of 12¢ per hr plus six paid holidays a year. This leaves only the differences of the union with Phelps Dodge and American Smelting & Refining Co. yet to be settled. Further discussions are scheduled for this week and there is a more hopeful outlook for continued production. The Braden Copper Co. strike is still in progress in Chile despite the earlier feeling that it could be adjusted in a few days. The strike picture in copper served to build up the price of export copper during the last few weeks to the point where it is in approximate balance with the domestic market price. Wire mill demand continues strong.

•

Zinc

• • • **A large tonnage** of prime western zinc from Japan has been offered to the domestic market and to the Army-Navy Munitions Board for stock piling by the U. S. Commercial Co. The Munitions Board has not yet expressed any interest in this metal as its present plans do not contemplate the stockpiling of this grade of zinc. Factors in the market who observe a current fair balance between supply and demand in all zinc grades foresee that if thrown on the market the 14,000 tons of Japanese zinc could well serve to demoralize the market. The U. S. Commercial Co. has made an offer of the zinc to the British Ministry of Supply and it has been indicated that if sold to them the price would have to be set at 9.50¢ per lb. Observers here, accustomed to comparing the domestic market with an f. a. s. Gulf Port price of 10.00¢, are anxious to find out whether the offer is accepted as this is expected to give a conclusive answer to the question as to the soundness of the domestic zinc price structure.

Monthly Average Prices

• • • **The average prices of the major nonferrous metals in July, based on quotations appearing in** THE IRON AGE, **were as follows:**

	Cents Per Pound
Electrolytic copper, Conn. Valley	21.50
Lake copper, Conn. Valley	21.625
Straits tin, New York	80.00
Zinc, East St. Louis	10.50
Zinc, New York	11.005
Lead, St. Louis	14.80
Lead, New York	15.00

•

U.K. Will Not Open London Metal Exchange

London

• • • **Pressed to** discontinue bulk buying of metals during a House of Commons debate on July 24, Mr. Wilmot, the British Minister of Supply, declared that until the position was clearer the government must persist in its policy.

Criticism had been voiced by Oliver Lyttelton, wartime Minister of Production and Controller of Nonferrous Metals in the first two years of the war. He maintained that all the skill and ingenuity in the world could not make bulk purchasing a success. A Government buyer could be seen a mile off and every time he made a bid as the biggest buyer in the world, the price was raised. He asked the Minister to let prices move with world markets.

Mr. Wilmot replied that the government had hoped that normal trading would have returned to the metal markets by now but the government was operating under abnormal conditions with an enormous U. S. demand, strikes dragging copper production down, and lead, zinc and tin output still suffering from the aftermath of the war.

•

Tin

• • • **The Netherlands** Government recognition of a self governing administration in the East Indies islands of Banka and Billiton, and the cessation of hostilities in the East Indies, is looked to by the trade to assure the anticipated large scale production of tin from these important tin producing islands in 1948. Malayan tin production continues to be handicapped by shortages of fuel and equipment and shows little promise of worthwhile tin production next year. The trade reports that some 500 tons of Belgian Congo tin is to be shipped here from Belgium during August.

•

Increase Tungsten Prices

New York

• • • **Due to a continuing** rise in the cost of tungsten ores, Electro Metallurgical Sales Corp. has announced further increases in the price of ferrotungsten and tungsten powder. The new prices are effective immediately on a spot basis and on September 1 for contract users.

Ferrotungsten prices are raised 25¢ per lb of contained tungsten, making the new Eastern Zone contract price $2.50 per lb in lots of 10,000 lb or more of contained tungsten. Tungsten metal powder prices are increased 15¢ a lb so that the new Eastern Zone contract price for the melting grade becomes $3.05 per lb in lots of 1,000 lb or more. Quantity, zone, and spot differentials remain unchanged.

Nonferrous Metals Prices

Cents per pound

	July 30	July 31	Aug. 1	Aug. 2	Aug. 4	Aug. 5
Copper, electro, Conn.	21.50	21.50	21.50	21.50	21.50	21.50
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	80.00	80.00	80.00	80.00	80.00	80.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50	10.50	10.50
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80	14.80

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point (min. 10,000 lb)	15.00
Aluminum pig, f.o.b. shipping point	14.00
Antimony, American Laredo Tex.	33.00
Beryllium copper, 3.75-4.25% Be: dollars per lb contained Be	$17.00
Beryllium aluminum, 5% Be, dollars per lb contained Be	$35.50
Cadmium, del'd	$1.75
Cobalt, 97-99% (per lb)	$1.65 to $1.72
Copper, electro, Conn. Valley	21.50
Copper, lake, Conn. Valley	21.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$80 to $90
Lead, St. Louis	14.80
Lead, New York	15.00
Magnesium, 99.8+%	20.50
Magnesium, sticks, carlots	36.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$85.00 to $87.00
Nickel, electro, f.o.b. New York	37.67
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$53 to $56
Silver, New York, cents per oz.	61.75
Tin, Straits, New York	80.00
Zinc, East St. Louis	10.50
Zinc, New York	11.005
Zirconium copper, 6 pct Zr, per lb contained Zr	$8.75

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot	
No. 115	19.00
No. 120	18.50
No. 123	18.00
80-10-10 ingot	
No. 305	23.00
No. 315	21.00
88-10-2 ingot	
No. 210	28.75
No. 215	27.25
No. 245	21.25
Yellow ingot	
No. 405	15.25
Manganese Bronze	
No. 421	17.25

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:	
0.30 copper, max.	15.75
0.60 copper, max.	15.50
Piston alloys (No. 122 type)	13.75
No. 12 alum. (No. 2 grade)	13.25
108 alloy	13.50
195 alloy	14.25
AXS-679	13.75
Steel deoxidizing aluminium, notch-bar, granulated or shot	
Grade 1—95 pct-97½ pct	14.50
Grade 2—92 pct-95 pct	12.50
Grade 3—90 pct-92 pct	11.75
Grade 4—85 pct-90 pct	11.00

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	37⅝
Electrodeposited	32.34
Rolled, oval, straight, delivered	32.59
Brass, 80-20, frt allowed	
Cast, oval, 15 in. or longer	33⅜
Zinc, Cast, 99.99	18¾
Nickel, 99 pct plus, frt allowed	
Cast	51
Rolled, depolarized	52
Silver 999 fine	
Rolled, 1000 oz. lots, per troy oz.	67¼

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	43.00
Copper sulphate, 99.5, crystals, bbls	11.50
Nickel salts, single, 425 lb bbls, frt allowed	14.50
Silver cyanide, 100 oz. lots, per oz.	54.00
Sodium cyanide, 96 pct, domestic, 200 lb drums	15.90
Zinc cyanide, 100 lb drums	34.00
Zinc, sulphate, 89 pct, crystals, bbls, frt allowed	7.75

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall: 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: ¼ in. and heavier: 2S, 3S, 21.2¢; 52S, 24.2¢ 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness: 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢; 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢; 1 in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam, rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18; 2S, 3S, 33.5¢; 56S, 39.5¢; 10,000 lb base. B & S gage 00-1: 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16; 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb. f.o.b. mill. Base quantity 30,000 lb.)

Sheet and Plate: Ma. FSa. ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 14, 69¢-74¢; 16, 79¢-81¢; 18, 87¢-89¢; 22, $1.25-$1.31; 24, $1.71-$1.75.

Round Rod: M, diam, in., ¼ to ⅜, 47¢; ½ to ¾, 45¢; 1¼ to 2½, 43.5¢; 3½ to 5, 42.5¢. Other alloys higher.

Square, Hexagonal Bar: M, size across flats, in., ¼ to ⅜, 52.5¢; ½ to ¾, 47.5¢; 1¼ to 2½, 45¢; 3½ to 5, 44¢. Other alloys nigher.

Solid Shapes, Rectangles: M, form factors, 1 to 4, 46¢; 11 to 13, 49¢; 20 to 22, 51.5¢; 29 to 31, 59.5¢ 38 to 40, 75.5¢ 47 to 49, 98¢. Other alloys higher.

Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 5/16, $1.21; 5/16 to ¾, $1.12; ⅜ to 7/16, 97¢; 0.058 to 0.064, 7/16 to ½, 89¢; ½ to ⅝, 81¢; 0.065 to 0.082, ⅝ to ¾, 76¢; ¾ to 1, 72¢ 0.083 to 0.108, 1 to 2, 68¢; 0.165 to 0.219, 2 to 3, 59¢; 3 to 4, 57¢. Other alloys higher.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets	..	41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks	..	31

Zinc

(Cents per lb, f.o.b. mill)

Sheet, l.c.l.	15.50
Ribbon, ton lots	14.50
Plates	
Small	13.50
Large, over 12 in.	14.50

Copper, Brass, Bronze

(Cents per pound, f.o.b. mill effective June 11)

	Extruded Shapes	Rods	Sheets
Copper	33.53	...	33.68
Copper, hot-rolled	....	30.03	....
Copper, drawn	....	31.03	....
Low brass	34.04*	31.07	31.38
Yellow brass	32.39*	29.32	29.63
Red brass	34.65*	31.68	31.99
Naval brass	29.56	28.31	34.25
Leaded brass	27.98	24.39	30.13
Commercial bronze	35.52*	32.80	33.11
Manganese bronze	33.14	31.64	37.75
Phosphor bronze, 5 pct.	53.25*	52.25	52.00
Muntz metal	29.17	27.92	32.36
Everdur, Herculoy, Olympic, etc.	37.07	35.57	38.44
Nickel silver, 5 pct.	41.20	40.28	38.67
Architectural bronze	27.94	....	....

*Seamless tubing.

Scrap Metals

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Brass Mill Scrap

(Lots of less than 15,000 lb.)

Cartridge brass turnings	14¼
Loose yellow brass trimmings	15¼

Copper and Brass

No. 1 heavy copper and wire	15½—16
No. 2 heavy copper and wire	14½—16
Light copper	13½—14
Auto radiators (unsweated)	8½— 9
No. 1 composition	10½—11
No. 1 composition turnings	10 —10½
Clean red car boxes	9 — 9½
Cocks and faucets	8½— 9
Mixed heavy yellow brass	7 — 7¼
Old rolled brass	7 — 7¼
Brass pipe	8 — 8½
New soft brass clippings	11 —11½
Brass rod ends	9½—10
No. 1 brass rod turnings	8½— 9

Aluminum

Alum. pistons free of struts	3½— 4
Aluminum crankcases	5 — 5½
2S aluminum clippings	8 — 8½
Old sheet & utensils	5½— 6
Mixed borings and turnings	—2
Misc. cast aluminum	5 — 5½
Dural clips (24S)	5 — 5½

Zinc

New zinc clippings	6 — 6½
Old zinc	4¼— 4½
Zinc routings	1½— 2
Old die cast scrap	2½— 3

Nickel and Monel

Pure nickel clippings	15½—17½
Clean nickel turnings	14 —15
Nickel anodes	16 —17
Nickel rod ends	17 —18
New Monel clippings	10 —10½
Clean Monel turnings	7 — 8
Old sheet Monel	9½—10
Old Monel castings	7½— 8
Inconel clippings	8 — 8½
Nickel silver clippings, mixed	7½— 8
Nickel silver turnings, mixed	5½— 6

Lead

Soft scrap lead	10 —10½
Battery plates (dry)	5 — 5½

Magnesium Alloys

Segregated solids	6½— 7
Castings	4½— 5½

Miscellaneous

Block tin	63 —65
No. 1 pewter	48 —50
No. 1 auto babbitt	38 —40
Mixed common babbitt	11½—12
Solder joints	12 —13
Siphon tops	38 —39
Small foundry type	13 —13½
Monotype	12 —12½
Lino and stereotype	11½—12
Electrotype	9½—10
New type shell cuttings	11 —11½
Clean hand picked type shells	4½— 5
Lino and stereo dross	5 — 5½
Electro dross	3 — 3¼

Lead Products

(Cents per lb)

F.o.b. shipping point freight collect. Freight equalized with nearest free delivery point.

Full lead sheets	18.25
Cut lead sheets	18.75
Lead pipe, manufacturing point	17.50
Lead traps and bends	List +42%
Combination lead and iron bends and ferrules, also combination lead and iron ferrules	List +42%
Lead wool	19.50

SCRAP

Steelmaking Grades Continue Advance

New York

• • • **Steelmaking scrap** prices are up again. A market that has been rising with only a few pauses and one reversal since OPA's death last November staged a repeat performance this week. And this week there was a new road company playing on the West Coast.

Buffalo led off the parade with a $4 gain and Chicago prices surged up $1.50, both for the heavier grades. In Pittsburgh and New York these grades were $1 higher; in Boston the rise was 50¢.

On the West Coast, where for many months sellers have been settling for a mere $2 over the OPA ceiling, the local mills discovered scrap buying strangers in their midst. Promptly they boosted prices $3 in Los Angeles and $2.50 in San Francisco to hold the material on the coast.

For the record it should be said that THE IRON AGE steel scrap composite again moved into virgin territory. This average of No. 1 steel scrap delivered at Pittsburgh, Philadelphia and Chicago was bumped up 92¢ to $41.75. Also for the record it should be reported that no substantial increase in scrap shipments has come from the whopping price increases of the past few weeks, according to many reliable trade sources.

•

PITTSBURGH—Heavy melting grades moved up $1 a ton this week in Pittsburgh and sales of short shoveling turnings at $37 a ton moved the price of this grade up $2 a ton. Railroad specialties are quoted at $48 to $49 a ton on the basis of the last sale, but it would be quite difficult to buy at that range today. Two or three railroad lists closed during the first part of the week, but prices paid for the scrap were not known in time for reflection in this week's quotations. Scrap rails and rails cut to 2 ft and under advanced sharply on the basis of sales made this week. There is still a strong undertone to the scrap market and the feeling in some quarters is that the top has not yet been reached on prices. However, a growing indication that the top is near has tended to bring out scrap. Scrap movement has improved. Railroad lists, on the whole, appear to be much larger, and brokers indicate that dealer scrap is not lingering any longer than necessary at the dealer level.

CHICAGO—Prices continued to soar last week. Even higher prices than those quoted had been paid by small non-integrated plants and for special tonnages of A-1 material. Brokers' buying prices are reported around $44, and out of district scrap is still being brought in. At the moment, anything out of the loop seems to be classified as "remote." The foundries appear to be in worse shape than the mills. Although railroad lists are now going at an all-time high this material has not always been awarded to the highest bidder. One Chicago mill is reported to be offering $43 for local openhearth scrap but this price could not be confirmed early in the week. The practice of over grading is again in vogue.

•

CLEVELAND — Scrap markets here and in the Valley are very strong and supply is weak. Dealers continue to shy away from orders and brokers are showing no enthusiasm for long-term tonnages. At least one major consumer did not wait for closing of the New York Central railroad lists and put out some $44.50 orders early this week for the Valley, according to reliable trade sources. The NYC lists were expected to top the Pennsylvania's $42.78 for heavy melting. Shipments to most consumers continue to fall short of consumption.

•

BOSTON—Heavy steel, turnings and borings prices have been boosted again without any appreciable increase in supplies. They are at a new peak. Cast for Western Massachusetts and Connecticut delivery is moving fairly freely at $43.50 to $44.50 f.o.b., or $48 to $50 delivered, and heavy breakable for Pennsylvania delivery at $40 f.o.b. Local foundries took very little cast the past week.

•

PHILADELPHIA—The rising price of scrap in this district was stabilized this week at the previous week's prices. The market was reported to be firm at these prices and scrap was said to be flowing in fair volume. The current prices are based on mill orders and apparently all factors are hesitant about making commitments based on higher market prices. There is no indication of a softening market at this time.

•

NEW YORK—The heavy melting steel buying price was at $36 to $36.50 early this week—up from last week's $35.25. Turnings were 50¢ higher. This has been a brokers' market; mill orders are few and far between. Shipments are none too good either; sales are often not made until the dealer has a car loaded and ready to roll. The cast grades held steady with considerable steel mill interest. Most buys for foundry customers were at $41.35, with little or no profit in the deals.

DETROIT—The scrap market remains strong in Detroit with large mill buyers holding to their previous quotations for openhearth grades in the face of a diminished flow of scrap. Turnings are in great demand with brokers' offering in some instances in excess of $32. The tie-up at Murray has already thrown a road block in the flow of industrial scrap and this situation will become worse if the threatened strike at Ford is called. Cast iron grades are holding firm at $40 per ton.

•

BUFFALO—Two of the principal local consumers of openhearth scrap came back into the market with a bang this week and heavy melting steel jumped $4 a ton to $42-43. Turnings and borings were not included in the new orders, but enjoyed a similar advance in sympathy with the top grades. Alloy-free shovelings were very strong. Metallurgical concerns at Niagara Falls were paying $37 to $38 delivered, although they still had tonnage due on old orders at $10 to $12 below these prices. Cast grades and railroad specialties were almost dead and nominally unchanged.

•

ST. LOUIS—There was a halt to the upward movement of prices here this week with price resistance by consumers. The largest user of railroad specialties is out of the market stating that prices are too high. Mills are hesitant about buying melting grades at present prices except for spot shipments which are difficult to obtain.

•

BIRMINGHAM—The market here at the beginning of the week had yet to reflect higher prices being paid in other areas. As a result, brokers and dealers were marking time, waiting for the local price situation to clarify. Steel grades were moving up from Gulf ports but they were going North for the higher prices.

•

TORONTO—Unless something develops without further delay to relieve the serious scrap shortage, Canadian steel making and foundry operations may be sharply curtailed in the closing months of this year. While importations are augmenting domestic supply, the available tonnage is still far below requirements and what reserve stocks are held in the country rapidly are being depleted.

•

Army Scrap Bill Signed

Washington

• • • **Presidential approval** of the military establishment appropriation bill last week gave the Army authority to set up a revolving fund of $25 million during the fiscal year 1948 to pay for the transportation, demilitarization and handling of overseas scrap. The absence of such authority has heretofore prevented the army from returning some overseas ferrous and non-ferrous scrap.

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 heavy melting	$42.50 to $43.00
RR. hvy. melting	43.50 to 44.00
No. 2 hvy. melting	42.50 to 43.00
RR. scrap rails	47.00 to 48.00
Rails 2 ft. and under	50.00 to 51.00
No. 1 comp'd bundles	42.50 to 43.00
Hand bdld. new shts.	42.50 to 43.00
Hvy. axle turn.	41.50 to 42.00
Hvy. steel forge turn.	41.50 to 42.00
Mach. shop turn.	34.00 to 35.00
Shoveling turn.	36.00 to 37.00
Mixed bor. and turn.	34.00 to 35.00
Cast iron borings	35.00 to 36.00
No. 1 cupola cast	41.00 to 42.00
Hvy. breakable cast	37.00 to 37.50
Malleable	52.00 to 53.00
RR. knuck and coup.	48.00 to 49.00
RR. coil springs	48.00 to 49.00
RR. leaf springs	48.00 to 49.00
Rolled steel wheels	48.00 to 49.00
Low phos.	48.00 to 48.50

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$41.50 to $42.00
No. 2 hvy. melting	41.50 to 42.00
No. 1 bundles	41.50 to 42.00
No. 2 dealers' bundles	41.50 to 42.00
Bundled mach. shop turn.	41.50 to 42.00
Galv. bundles	39.50 to 40.00
Mach. shop turn.	36.50 to 37.00
Short shov. turn.	38.50 to 39.00
Cast iron borings	37.50 to 38.00
Mix. borings & turn.	36.50 to 37.00
Low phos, hvy. forge.	48.00 to 48.50
Low phos. plates	45.00 to 46.00
No. 1 RR. hvy. melt.	44.50 to 45.50
Rerolling rails	51.00 to 51.50
Miscellaneous rails	47.50 to 48.00
Angles & splice bars	48.50 to 49.00
Locomotive tires, cut	45.00 to 46.00
Cut bolster & side frames	47.50 to 48.00
Standard stl. car axles	51.00 to 51.50
No. 3 steel wheels	46.50 to 47.00
Couplers & Knuckles	47.00 to 48.00
Malleable	61.00 to 63.00
No. 1 mach. Cast.	51.00 to 51.50
Rails 2 ft. and under	52.00 to 52.50
No. 1 agricul. cast.	46.00 to 47.00
Hvy. breakable cast.	40.00 to 44.00
RR. grate bars	44.00 to 44.50
Cast iron brake shoes	46.50 to 47.00
Cast iron carwheels	44.50 to 45.50

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$37.50 to $38.00
No. 2 hvy. melting	37.50 to 38.00
No. 1 bundles	37.50 to 38.00
No. 2 bundles	37.50 to 38.00
Mach. shop turn.	32.50 to 33.00
Shoveling turn.	34.50 to 35.00
Cast iron borings	32.50 to 33.00
Mixed bor. & turn.	32.50 to 33.00
Low phos. plate	41.00 to 42.00
No. 1 cupola cast	**46.00 to 47.00**
Hvy. breakable cast.	39.00 to 40.00
Scrap rails	41.00 to 42.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 hvy. melting	$36.00 to $37.00
No. 2 hvy. melting	36.00 to 37.00
Nos. 1 and 2 bundles	36.00 to 37.00
Busheling	36.00 to 37.00
Shoveling turn.	29.00 to 29.50
Machine shop turn.	27.00 to 27.50
Mixed bor. & turn.	27.00 to 27.50
Cl'n cast. chem. bor.	26.00 to 27.00
No. 1 machinery cast.	43.50 to 44.50
No. 2 machinery cast.	43.50 to 44.50
Heavy breakable cast.	40.00 to 45.00
Stove plate	40.00 to 45.00

DETROIT

Per gross ton, brokers' buying prices, f.o.b. cars:

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	37.00 to 38.00
No. 1 bundles	37.00 to 38.00
New busheling	37.00 to 38.00
Flashings	37.00 to 38.00
Mach. shop turn.	29.50 to 30.50
Shoveling turn.	30.00 to 31.00
Cast iron borings	30.00 to 31.00
Mixed bor. & turn.	30.00 to 31.00
Low phos. plate	40.00 to 41.00
No. 1 cupola cast.	39.50 to 40.50
Hvy. breakable cast.	31.00 to 32.00
Stove plate	**32.00 to 34.00**
Automotive cast.	**38.00 to 40.00**

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$40.00 to $41.00
No. 2 hvy. melting	40.00 to 41.00
No. 1 bundles	40.00 to 41.00
No. 2 bundles	40.00 to 41.00
Mach. shop turn.	31.00 to 32.00
Shoveling turn.	32.00 to 33.00
Mixed bor. & turn.	31.00 to 32.00
Clean cast chemical bor.	34.00 to 35.00
No. 1 cupola cast	48.00 to 49.00
Hvy. breakable cast.	47.00 to 48.00
Cast. charging box.	47.00 to 48.00
Clean auto cast.	48.00 to 49.00
Hvy. axle forge turn.	40.00 to 41.00
Low phos. plate	44.00 to 45.00
Low phos. punchings	44.00 to 45.00
Low phos. bundles	43.00 to 44.00
RR. steel wheels	45.00 to 46.00
RR. coil springs	45.00 to 46.00
RR. malleable	55.00 to 57.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	38.00 to 39.00
Bundled sheets	38.00 to 39.00
Mach. shop turn.	31.25 to 32.25
Locomotive tires, uncut	41.00 to 42.00
Mis. std. sec. rails	42.00 to 43.00
Rerolling rails	48.00 to 49.00
Steel angle bars	40.00 to 41.00
Rails 3 ft. and under	43.00 to 44.00
RR. steel springs	40.50 to 41.50
Steel car axles	41.50 to 42.50
Grate bars	36.00 to 37.00
Brake shoes	38.00 to 39.00
Malleable	54.00 to 56.00
Cast iron car wheels	42.00 to 43.00
No. 1 machinery cast	**43.00 to 44.00**
Hvy. breakable cast	35.00 to 36.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$35.50 to $36.00
No. 2 hvy. melting	35.50 to 36.00
No. 2 bundles	35.50 to 36.00
No. 1 busheling	35.50 to 36.00
Long turnings	24.00 to 24.50
Shoveling turnings	**26.00 to 27.00**
Cast iron borings	24.50 to 25.00
Bar crops and plate	38.00 to 38.50
Structural and plate	38.00 to 38.50
No. 1 cupola cast.	42.00 to 42.50
Stove plate	40.00 to 40.50
No. 1 RR. hvy. melt.	36.50 to 37.00
Steel axles	38.50 to 39.00
Scrap rails	**38.50 to 39.00**
Rerolling rails	40.50 to 41.00
Angles & splice bars	40.50 to 41.00
Rails 3 ft. & under	40.50 to 41.00
Cast iron carwheels	35.00 to 36.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$44.00 to $45.00
No. 2 hvy. melting	44.00 to 45.00
Mach. shop turn.	**33.00 to 34.00**
Short shov. turn.	**34.00 to 35.00**
Cast iron borings	34.00 to 35.00
Low phos.	46.00 to 47.00

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$36.00 to $36.50
No. 2 hvy. melting	36.00 to 36.50
No. 2 bundles	36.00 to 36.50
Comp. galv. bundles	34.00 to 36.00
Mach. shop turn.	28.00 to 28.50
Mixed bor. & turn.	28.00 to 28.50
Shoveling turn.	30.00 to 30.50
No. 1 cupola cast.	41.00 to 41.50
Hvy. breakable cast.	41.00 to 41.50
Charging box cast.	41.00 to 41.50
Stove plate	41.00 to 41.50
Clean auto cast.	41.00 to 41.50
Unstrip. motor blks.	37.00 to 38.00
Cl'n chem. cast bor.	29.50 to 30.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$42.00 to $43.00
No. 2 hvy. melting	42.00 to 43.00
No. 1 bundles	42.00 to 43.00
No. 2 bundles	42.00 to 43.00
No. 1 busheling	42.00 to 43.00
Mach. shop turn.	32.00 to 33.00
Shoveling turn.	34.00 to 35.00
Cast iron borings	32.00 to 33.00
Mixed bor. & turn.	32.00 to 33.00
No. 1 cupola cast.	38.00 to 40.00
Charging box cast.	33.00 to 35.00
Stove plate	35.00 to 38.00
Clean auto cast.	38.00 to 40.00
Malleable	39.00 to 41.00
Low phos. plate	38.00 to 40.00
Scrap rails	37.00 to 38.00
Rails 3 ft. & under	40.00 to 42.00
RR. steel wheels	40.00 to 42.00
Cast iron carwheels	40.00 to 42.00
RR. coil & leaf spgs.	40.00 to 42.00
RR. knuckles & coup	40.00 to 42.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$42.00 to $43.00
No. 2 hvy. melting	42.00 to 43.00
No. 1 bundles	42.00 to 43.00
No. 2 bundles	42.00 to 43.00
Drop forge flashings	42.00 to 43.00
Mach. shop turn.	32.00 to 33.00
Shoveling turn.	33.00 to 34.00
No. 1 busheling	42.00 to 43.00
Steel axle turn.	42.00 to 43.00
Cast iron borings	33.00 to 34.00
Mixed bor. & turn.	32.00 to 32.50
Low phos.	43.00 to 44.00
No. 1 machinery cast.	47.00 to 47.50
Malleable	54.00 to 55.00
RR. Cast.	47.00 to 47.50
Railroad grate bars	42.00 to 44.00
Stove plate	**42.00 to 44.00**
RR. hvy. melting	42.00 to 43.00
Rails 3 ft. & under	47.00 to 48.00
Rails 18 in. & under	48.00 to 49.00

SAN FRANCISCO

Per gross ton f.o.b. shipping point

No. 1 hvy. melting	$22.00
No. 2 hvy. melting	22.00
No. 2 bales	22.00

Per gross ton delivered to consumer

No. 3 bales	$16.50
Mach. shop turn.	13.00
Elec. furn. 1 ft. und.	26.00
No. 1 cupola cast.	$32.00 to 33.00
RR. hvy. melting	23.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$22.50
No. 2 hvy. melting	22.50
No. 1 bales	22.50
No. 2 bales	22.50
No. 3 bales	16.00
Mach. shop turn.	14.50
No. 1 cupola cast.	$32.00 to 33.00
RR. hvy. melting	23.00

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. hvy. melt.	$20.00 to $22.00
Elec. furn. 1 ft. und.	$25.50 to 27.00
No. 1 cupola cast.	29.00
RR. hvy. melting	23.00

HAMILTON, ONT.

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

Heavy melting	$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushelings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	20.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

* Ceiling price.

Comparison of Prices . .

Advances over past week in **Heavy Type**, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	Aug. 5, 1947	July 29, 1947	July 8, 1947	Aug. 6, 1946
Hot-rolled sheets	2.80	2.80	2.50	2.425
Cold-rolled sheets	3.55	3.55	3.20	3.275
Galvanized sheets (10 ga.)	3.95	3.95	3.55	4.05*
Hot-rolled strip	2.80	2.80	2.50	2.45
Cold-rolled strip	3.55	3.55	3.20	3.05
Plates	2.95	2.95	2.65	2.50
Plates, wrought iron	6.85	5.95	5.95	4.112
Stain's c-r strip (No. 302) *24 ga	30.30	30.30	30.30	30.30
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes.	$5.75	$5.75	$5.75	$5.00
Tinplate, electro (0.50 lb)	5.05	5.05	5.05	4.50
Special coated mfg. ternes	4.90	4.90	4.90	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.90	2.90	2.60	2.50
Cold-finished bars	3.55	3.55	3.20	3.10
Alloy bars	3.30	3.30	3.05	2.92
Structural shapes	2.80	2.80	2.50	2.35
Stainless bars (No. 302)	26.00	26.00	26.00	25.97
Wrought iron bars	7.15	6.15	6.15	4.76
Wire and Wire Products: (cents per pound)				
Bright wire	3.55	3.55	3.30	3.05
Wire nails	4.25	4.25	3.75	3.75
Rails: (dollars per 100 lb)				
Heavy rails	$2.50	$2.50	$2.50	$43.39*
Light rails	2.85	2.85	2.85	49.18*
*per net ton				
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$45.00*	$45.00	$42.00	$39.00
Sheet bars	59.00	59.00	50.00	38.00
Slabs, rerolling	45.00*	45.00	42.00	39.00
Forging Billets	55.00*	55.00	50.00	47.00
Alloy blooms, billets, slabs *Revised	66.00	66.00	61.00	58.43
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.80*	2.80	2.55	2.30
Skelp *Revised	2.60	2.35	2.35	2.05

Pig Iron: (per gross ton)	Aug. 5, 1947	July 29, 1947	July 8, 1947	Aug. 6, 1946
No. 2, foundry, Phila.	$40.39	$40.39	$38.22	$30.43
No. 2, Valley furnace	36.50	36.50	33.50	28.50
No. 2, Southern Cin'ti	38.25	38.25	34.75	27.80
No. 2, Birmingham	33.38	33.38	29.88	24.88
No. 2, foundry, Chicago†	36.00	36.00	33.00	28.50
Basic del'd Philadelphia	39.89	39.89	37.72	29.93
Basic, Valley furnace	36.00	36.00	33.00	28.00
Malleable, Chicago†	36.50	36.50	33.50	28.50
Malleable, Valley	36.50	36.50	33.50	28.50
Charcoal, Chicago	48.49	48.49	45.99	42.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$42.75	$41.75	$35.75	$20.00
Heavy melt'g steel, Phila.	40.50	40.50	37.25	18.75
Heavy melt'g steel, Ch'go.	41.75	40.25	33.75	18.75
No. 1, hy. comp. sheet, Det.	37.50	37.50	33.25	17.32
Low phos. Youngs'n	46.50	46.50	38.75	22.50
No. 1, cast, Pittsburgh	41.50	39.75	36.50	20.00
No. 1, cast, Philadelphia	48.50	48.50	46.50	20.00
No. 1, cast, Chicago	51.25	47.50	45.50	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$12.00	$12.00	$10.50	$7.50
Foundry coke, prompt	13.75	13.75	11.25	8.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	21.50	21.50	21.50	14.375
Copper, Lake, Conn.	21.625	21.625	21.625	14.375
Tin, Straits, New York	80.00	80.00	80.00	52.00
Zinc, East St. Louis	10.50	10.50	10.50	8.25
Lead, St. Louis	14.80	14.80	14.80	8.10
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	37.67	37.67	37.67	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	33.00	33.00	33.00	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when shipments for this quarter are compiled.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Aug. 5, 1947	3.17956¢ per lb.	$36.38 per gross ton	$41.75 per gross ton
One week ago	3.16613¢ per lb.	$36.38 per gross ton	$40.83 per gross ton
One month ago	2.87118¢ per lb.	$33.43 per gross ton	$35.58 per gross ton
One year ago	2.70711¢ per lb.	$28.13 per gross ton	$19.17 per gross ton

	HIGH	LOW	HIGH	LOW	HIGH	LOW
1947	3.17956¢ Aug. 5	2.87118¢ Jan. 7	$36.38 July 29	$30.14 Jan. 7	$41.75 Aug. 5	$29.50 May 20
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

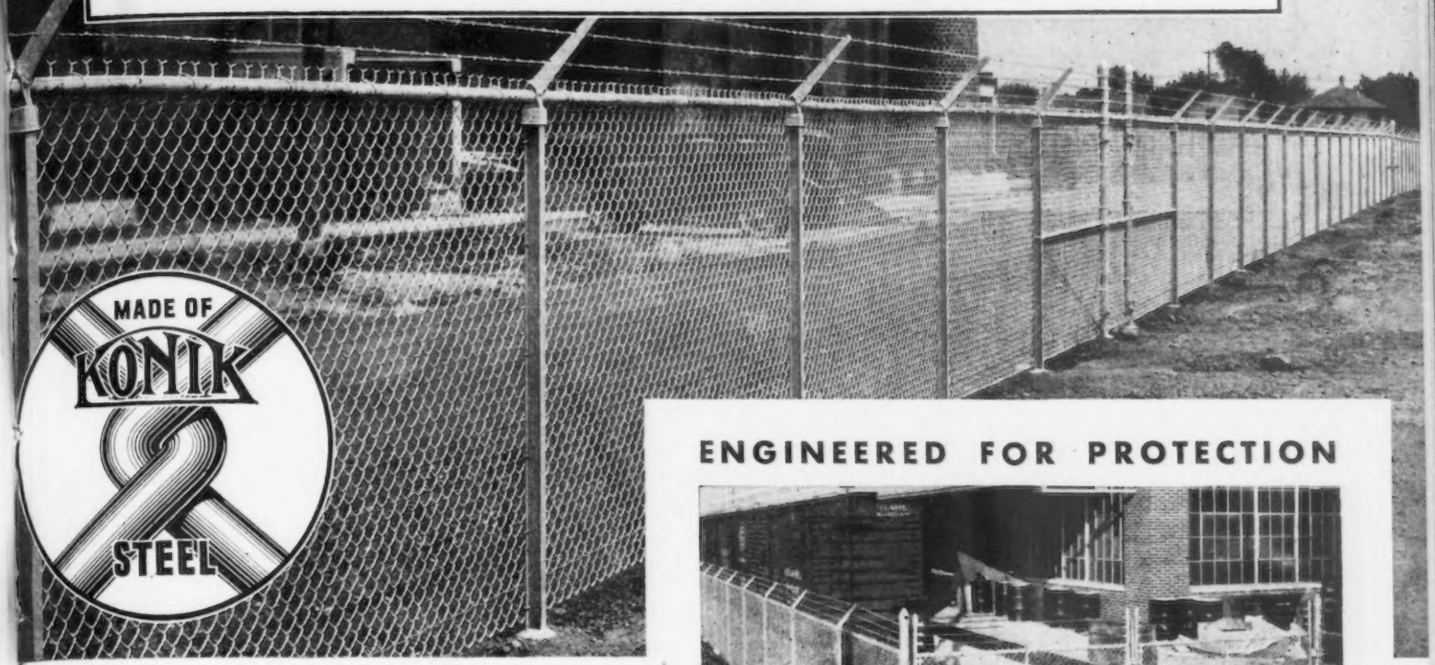
Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

CONTINENTAL KONIK*...

THE FENCE FABRIC WITH A *FUTURE!*



Continental Chain Link fence provides property protection at lower cost through longer fence life. The fabric in this fence is made of KONIK . . . a patented steel containing copper, nickel and chromium. KONIK possesses greater tensile strength and a higher elastic limit and is rust-resistant "clear through."

All this greater strength and rust-resistance . . . all the "clear through" quality of KONIK Steel . . . all these extra values come to you only in Continental Chain Link fence . . . and you get them at no added cost. Ask Continental fence engineers to help with your property protection problems . . . write Continental today.

SEND FOR YOUR FREE COPY

Get a copy of "Planned Protection," a complete manual on modern protection and control of property. Phone the nearest sales office or write—

ENGINEERED FOR PROTECTION

Continental fence has 14 distinctive construction features including heavier line posts . . . stronger and more easily operated gates . . . improved pivot-type hinges . . . self-locking barb arms . . . full gage wire of KONIK steel . . . fastened with 20% more ties

TAILORED TO FIT YOUR PROPERTY

Experienced fence engineers plan and help erect Continental Chain Link fence. They work with you in laying out the most effective and economical installation to harmonize with the character of property, and to provide the type of protection you need.

★ TRADE MARK REG. U. S. PAT. OFF.

CONTINENTAL STEEL CORPORATION

GENERAL OFFICES • KOKOMO, INDIANA

PRODUCERS OF *Manufacturer's Wire* in many sizes, shapes, tempers and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, Lead Coated, and special wire. ALSO, Coated and Uncoated Steel Sheets, Nails, Continental Chain Link Fence, and other products

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25c above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producers to consumer. (8) Also shafting. For quantities of 20,000 lb to 89,999 lb. (9) Carload lot in manufacturing trade. (10) Delivered Los Angeles only. (11) Boxed. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only: Includes 3 pct freight tax. (14) Delivered Kaiser Co. prices: includes 3 pct freight tax. (15) to 0.035 to 0.075 in. thick by ¾ to 3½ in. wide. (16) Spot market as high as $92 gross ton. (17) Delivered Los Angeles: add ½c per 100 lb for San Francisco. (18) Slab prices subject to negotiation in most cases. Some producers charge (19) $5 more, (20) $3 more, (21) $1 more. U. S. Steel Corp. subsidiaries charge (22) 0.05¢ less, (23) 0.10¢ less, (24) 0.20¢ less.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		San Franc'co, Los Angeles, Seattle	DELIVERED TO Detroit	New York	Philadelphia
INGOTS															
Carbon, rerolling	($36.00 f. o. b. mill) (Spot market as high as $80 gross ton)														
Carbon, forging	$46.00														
Alloy	$56.00						(Canton = $56.00)								
BILLETS, BLOOMS, SLABS															
Carbon, rerolling [18]	$45.00[19]	$45.00[19]	$45.00[19]	$50.00	$45.00[19]	$45.00[19]	$50.00	$45.00[19]					$48.00[19]		
Carbon, forging billets	$55.00[20]	$55.00[20]	$55.00[20]	$58.00	$55.00[20]	$55.00[20]	$58.00		(Duluth = $57.00)				$58.00[20]		
Alloy	$66.00	$66.00				$66.00	(Bethlehem, Massillon, Canton = $66.00)						$69.00		
SHEET BARS[16]							$59.00								
PIPE SKELP	2.60¢[21]	2.65¢					2.60¢[21]	2.60¢[21]							
WIRE RODS	2.80¢[21]	2.80¢[21]		2.80¢[21]	2.85¢		(Worcester = 2.90¢[21])					3.52¢[13]			
SHEETS															
Hot-rolled	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	3.175¢	(Ashland, Ky. = 2.80¢)		3.54[17]¢	2.95¢	3.09¢	3.00¢
Cold-rolled[1]	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢	3.55¢		3.65¢	3.55¢			3.70¢	3.96¢	3.93¢
Galvanized (10 gage)	3.95¢[23]	3.95¢[23]	3.95¢[23]		3.95¢[23]		3.95¢	3.85¢	4.05¢	3.95¢		4.62¢[17]		4.14¢	4.05¢
Enameling (12 gage)	3.95¢[22]	3.95¢[22]	3.95¢[22]	3.95¢			3.95¢		4.05¢	3.95¢			4.10¢[22]	4.35¢	4.33¢
Long ternes [2] (10 gage)	4.05¢[24]	4.05¢	4.05¢[24]											4.45¢	4.41¢
STRIP															
Hot-rolled [3]	2.80¢	2.80¢	2.80¢	2.80¢[15]	2.80¢		2.80¢					3.60¢[17]	2.95¢	3.23¢	3.18¢
Cold-rolled [4]	3.55¢	3.65¢		3.55¢			3.55¢			(Worcester = 3.75¢)			3.70¢	3.96¢	3.93¢
Cooperage stock	3.10¢	3.10¢			3.10¢		3.10¢							3.39¢	
TINPLATE															
Standard cokes, base box	$5.75	$5.75	$5.75		$5.85			$5.85	$5.85			(Warren, Ohio = $5.75)		$6.175	$6.062[11]
Electro, box (0.25 lb.)	Deduct 90¢ from standard coke base box price.														
Electro, box (0.50 lb.)	Deduct 70¢ from standard coke base box price.														
Electro, box (0.75 lb.)	Deduct 50¢ from standard coke base box price.														
BLACKPLATE, 29 gage[5]	3.90¢	3.90¢	3.90¢		4.00¢			4.00¢	4.00¢					4.29¢	4.20¢
BLACKPLATE, CANMAKING															
55 lb. to 70 lb.	Deduct $1.55 from standard coke base box.														
75 lb. to 95 lb.	Deduct $1.65 from standard coke base box.														
100 lb. to 118 lb.	Deduct $1.55 from standard coke base box.														
TERNES, MFG., Special coated	Deduct 85¢ from standard coke base box price.														
BARS															
Carbon steel	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢					3.625¢[17]	3.05¢	3.31¢	3.28¢
Rail steel[6]	Subject to negotiation because of fluctuating scrap prices.														
Reinforcing (billet)[7]	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢				3.325¢[17]		3.04¢	2.95¢
Reinforcing (rail)	Subject to negotiation because of fluctuating scrap prices.														
Cold-finished[8]	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢							3.70¢	3.96¢	3.93¢
Alloy, hot-rolled	3.30¢	3.30¢				3.30¢	3.30¢	(Bethlehem, Massillon, Canton = 3.30¢)					3.45¢		3.44¢
Alloy, cold-drawn	4.10¢	4.10¢	4.10¢	4.10¢		4.10¢							4.25¢		
PLATE								(Coatesville = 3.15¢, Claymont = 3.15¢, Geneva, Utah = 3.58¢)							
Carbon steel[12]	2.95¢	2.95¢	2.95¢	2.95¢	2.95¢		2.95¢	2.95¢				3.76¢[14]		3.17¢	3.15¢
Floor plates	4.20¢	4.20¢												4.60¢	4.58¢
Alloy	3.80¢	3.80¢			(Coatesville = 4.50¢)									4.02¢	3.895¢
SHAPES, Structural	2.80¢	2.80¢	2.80¢		2.80¢	2.80¢	(Geneva, Utah = 3.43¢) (Bethlehem = 2.80¢)					3.47¢[10]		3.00¢	2.94¢
SPRING STEEL, C-R															
0.26 to 0.40 carbon	3.20¢			3.20¢			(Worcester = 3.40¢)								
0.41 to 0.60 carbon	4.70¢			4.70¢			(Worcester = 4.90¢)								
0.61 to 0.80 carbon	5.30¢			5.30¢			(Worcester = 5.50¢)								
0.81 to 1.00 carbon	6.80¢			6.80¢			(Worcester = 7.00¢)								
Over 1.00 carbon	9.10¢			9.10¢			(Worcester = 9.30¢)								
MANUFACTURERS' WIRE[9]															
Bright	3.55¢	3.55¢		3.55¢	3.55¢		(Worcester = 3.65¢, Duluth = 3.60¢)					4.56¢[13]		3.96¢	3.93¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.25¢	4.25¢		4.25¢	(Worcester = 4.35¢, Duluth = 4.50¢) (Trenton = 4.50¢)							5.28¢[13]		4.66¢	4.595¢
PILING, Steel sheet	3.30¢	3.30¢				3.30¢								3.71¢	3.68¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt	Subject to negotiation			Subject to negotiation		
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	Subject to negotiation			Subject to negotiation		
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville	23.00	22 50	17.50	17.50	21.00	25.50
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.50	26.00	20 50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	27.50	26.00	20 50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton	31.50	29 50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi	27.50	26 00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Canton, Balt	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23 50	18.50	19.00	26.00	38.00
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	32.50	30 50	24.00	24.50	35.00	56.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila, Ft. Wayne	27.50	26.00	20.50	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.46	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, P'gh, Chi, Canton (4 to 8 in.)	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, Ohio)*

W	Cr	V	Mo	Base per lb
18	4	1	—	74¢
1.5	4	1.5	8	59¢
6	4	2	6	63¢

High-carbon-chromium* ..... 47¢
Oil hardening manganese* ..... 26¢
Special carbon* ..... 24¢
Extra carbon* ..... 20¢
Regular carbon* ..... 16¢

Warehouse prices on and east of Mississippi are 2¢ per lb. higher; west of Mississippi, 4¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Field grade	4.50¢
Armature	4.80¢
Electrical	5.30¢
Motor	6.05¢
Dynamo	6.75¢
Transformer 72	7.25¢
Transformer 65	7.95¢
Transformer 58	8.65¢
Transformer 52	9.45¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb
No. 1 O.H., per 100 lb $2.75
Angle splice bars, 100 lb 3.25
(F.o.b. basing points) *per 100 lb*
Light rails (from billets) $3.10
Light rails (from rail steel), f.o.b. Williamsport, Pa. 3.45

	Base per lb
Cut spikes	4.85¢
Screw spikes	6.75¢
Tie plate, steel	3.05¢
Tie plates, Fittsburg, Calif.	3.20¢
Track bolts	6.75¢
Track bolts, heat treated, to rail roads	7.00¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio; Weirton, W. Va.; St. Louis, Kansas City, Minnequa, Colo.; Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa.; Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa.; Richmond.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$7.05	$14.10

CLAD STEEL

Base prices, cents per pound

Stainless-clad	Plate	Sheet
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	*24.00	*22.00
Nickel-clad 10 pct, f.o.b. Coatesville, Pa.	21.50	....
Inconel-clad 10 pct, f.o.b. Coatesville	30.00	....
Monel-clad 10 pct, f.o.b. Coatesville	29.00	....
Aluminized steel Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

* Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per keg	Delivered San Francisco
Standard & coated nails	$4.25†	$5.33
Galvanized nails‡‡	4.00	5.08
Cut nails, carloads, Pittsburgh base	5.80	....

† 10¢ additional at Cleveland, 35¢ at Worcester. ‡‡ Plus $2.75 per 100 lb galvanizing extra.

	Base per 100 lb	
Annealed fence wire	$4.20‡	$5.21
Annealed galv. fence wire	4.65‡	5.66

‡10¢ additional at Worcester.

To the dealer f.o.b. Pittsburgh, Chicago, Birmingham

	Base	column
Woven wire fence*	91	114
Fence posts, carloads	90††	..
Single loop bale ties	91	115
Galvanized barbed wire**	101	121
Twisted barbless wire	90	....

* 15½ gage and heavier. ** On 80-rod spools in carload quantities. ††Pittsburgh, Duluth.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Alde-cor	Corten	Double Strength No. 1	Dyn-alloy	HI Steel	Mayari R	Otis-coloy	Yoloy	NAX High Tensile
Producer	Repub-lic	Carnegie-Illinois, Republic	Repub-lic	Alan Wood	Inland	Bethle-hem	Jones & Laughlin	Youngs-town Sheet & Tube	Great Lakes Steel
Plates	4.10	4.55	4.10	4.55	4.55	4.55	4.55	4.55	4.55
Sheets									
Hot-rolled	3.85	4.30	3.85	4.30	4 30	4.30	4.30	4.30	4.30
Cold-rolled	4.75	5.30	4.75		5.30	5.30	5.30	5.30	5.30
Galvanized		5.85	..			6.00	....	....	
Strip									
Hot-rolled	3.85	4.30	3.85		4.30	4.30	4.30	4.30	4.30
Cold-rolled			4.75			5.30	5.30	5.30	5.30†
Shapes	....	4.30	....	....	4.30	4.30	4.20	4.30	
Beams	....	4.30	....	....	....	4.30	....	....	....
Bars									
Hot-rolled	4.00	4.45	4.00	....	....	4.45	4.45	4.45	4.45
Cold-rolled	....	....	..	....	....	....	....	....	
Bar shapes	....	4.45	....	....	4.45	4.45	4.45	4.45	....

† Pittsburgh, add 0.10¢ at Chicago and Gary.

PIPE AND TUBING

Base discounts. f.o.b. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only
Base price, $200.00 per net ton

Standard, threaded & coupled

Steel, buttweld	Black	Galv.
½-in.	50½	34½
¾-in.	53½	38½
1-in.	56	41½
1¼-in.	56½	42
1½-in.	57	42½
2 in.	57½	43
2½ and 3-in.	58	43½
Wrought Iron, buttweld		
½-in.	+ 7	+29
¾-in.	2½	+19
1 and 1¼-in.	8	+11
1½-in.	13½	+ 7½
2-in.	14	+ 7
Steel, seamless		
2-in.	48	33
2½ and 3-in.	51	36
3½ to 7-in.	53	38
Wrought Iron, lapweld		
2-in.	5½	+14½
2½ to 3½-in.	8	+10½
4-in.	12	+ 5
4½ to 8-in.	10	+ 6½

Extra Strong, plain ends

Steel, buttweld		
½-in.	49½	35
¾-in.	53½	39
1 to 3-in.	55½	42
1¼-in.	56	42½
1½-in.	56½	43
2-in.	57	43½
2½ and 3-in.	57½	44
Wrought Iron, buttweld		
½-in.	+ 2½	+23
¾-in.	3½	+17
1 to 2-in.	13	+ 7
Steel, seamless		
2-in.	47	33
2½ and 3-in.	51	37
3½ to 7-in.	54½	40½
Wrought Iron, lapweld		
2-in.	8½	+11
2½ to 4-in.	17½	+ ½
4½ to 6-in.	13	+ 5

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots, cut length 4 to 24 ft, inclusive.

OD in.	Gage BWG	Seamless Hot-Rolled	Seamless Cold-Drawn
2	13	$16.67	$19.81
2½	12	22.42	26.63
3	12	24.93	29.63
3½	11	31.17	37.04
4	10	38.69	45.95

CAST IRON WATER PIPE

	Per net ton
6-in. to 24-in. del'd Chicago	$85.06
6-in. to 24-in. del'd New York	83.30
6-in. to 24-in., Birmingham	74.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less	98.50

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

	Percent Off List
½ in. & smaller x 6 in. & shorter	48
9/16 & ⅝ in. x 6 in. & shorter	50
All larger diam and longer lengths	47
Lag, all diam over 6 in. long	48
Lag, all diam x 6 in. & shorter	50
Plow bolts	57

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	48
9/16 to 1 in. inclusive	47
1⅛ to 1½ in. inclusive	45
1⅝ in. and larger	40

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	USS	SAE
Base discount less case lots		
7/16 in. and smaller		51
½ in. and smaller	50	..
½ in. through 1 in.		48
9/16 in. through 1 in.	49	..
1⅛ in. through 1½ in.	47	46
1⅝ in. and larger	40	..

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts	*Consumer*
Packages, nuts separate	65 and 10
In bulk	75

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets *(½ in. and larger)*	*Base per 100 lb*
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$5.25
F.o.b. Lebanon, Pa.	5.40

Small Rivets *(7/16 in. and smaller)*	*Percent Off List*
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	55 and 5

Cap and Set Screws *(In packages)*	*Percent Off List Consumer*
Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	56
¾ to 1 in. x 6 in., SAE 1035, heat treated	47
Set screws, cup and oval points	61
Milled studs	33
Flat head cap screws, listed sizes	21
Fillister head cap, listed sizes	40

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Metallurgical grade, f.o.b. producing plant.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports*)

	Per Gross Ton
Old range, bessemer	$5.95
Old range, nonbessemer	5.80
Mesabi, bessemer	5.70
Mesabi, nonbessemer	5.55
High phosphorus	5.55

Prices quoted retroactive to Jan. 1, 1947.

METAL POWDERS

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh	24¢ to 28½¢
Copper, electrolytic, 100 and 325 mesh	30¢ to 31½¢
Copper, reduced, 150 and 200 mesh	29¢ to 30½¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe carlots	10¢ to 15¢
Swedish sponge iron, 100 mesh, c.i.f. N. Y., carlots, ocean bags	7.4¢ to 8.5¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	5¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots	63¢ to 80¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	35¢ to 37¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	29¢ to 31¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢ to $1.75
Aluminum, 100, 200 mesh, carlots	23¢ to 26¢
Antimony, 100 mesh	36.05¢
Cadmium, 100 mesh	$2.00
Chromium, 100 mesh and finer	$1.025
Lead, 100, 200, & 300 mesh	18.50¢ to 23.50¢
Manganese, minus 325 mesh and coarser	49¢
Nickel, 150 mesh	51½¢
Silicon, 100 mesh	26¢
Solder powder, 100 mesh	8½¢ plus metal
Stainless steel, 302, minus 100 mesh	75¢
Tin, 100 mesh	90¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$3.05
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb.	$2.65
Under 100 lb	$2.90

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	$11.50 to $12.50
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	13.00 to 14.50
Foundry, Byproduct	
Chicago, del'd	$17.10
Chicago, f.o.b.	16.10
New England, del'd	17.25
Seaboard, Kearney, N. J., f.o.b.	15.35
Philadelphia, f.o.b.	15.50
Swedeland, Pa., f.o.b.	15.50
Buffalo, del'd	18.25
Ashland, Ohio, f.o.b.	14.50
Painesville, Ohio, f.o.b.	14.60
Erie, del'd	16.75
Cleveland, del'd	15.90
Cincinnati, del'd	15.39
St. Louis, del'd	15.85
Birmingham, del'd	15.00

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Carloads, Per 1000
First quality, Ohio	$64.00
First quality, Pa., Md., Ky., Mo.	70.00
First quality, New Jersey	75.00
Sec. quality, Pa., Md., Ky., Mo.	64.00
Sec. quality, New Jersey	59.00
Sec. quality, Ohio	56.00
Ground fire clay, net ton, bulk	10.00

Silica Brick

Pennsylvania and Birmingham	$70.00
Chicago District	79.00
Silica cement, net ton (Eastern)	12.00
East Chicago	13.00

Chrome Brick	*Per Net Ton*
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$59.00

Magnesite Brick

Standard, Balt. and Chester	$81.00
Chemically bonded, Baltimore	70.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in bulk	$44.50
Domestic, f.o.b. Chewelah, Wash., in bulk	24.00
in sacks	28.00
Clinker (dead burned) dolomite, bulk, per net ton, f.o.b. Billmeyer, Pa., Millersville, Ohio	10.50

Midwest, add 10¢; Mo. Valley, add 20¢

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia	$3 99	$5 18	$5 29	$4 43	$5 28	$4.44	$4 22	$4.48	$5 13	$8.37	$8.37	$9 88	$9 88
New York	4 67	5.67[1]	6 07	4.67	5.45	4 72	4.42	4.82	5.52	8.42	8 42	9 92	9.92
Boston	4.40	5.22	4.95[12]	4.85	6.38	4.70	4.47	4.62	5.22	8 62	8.62	9.97	9.97
Baltimore	3.89	....	5.14	4.40	....	4.39	4.34	4.46	5.10	....	....	....	....
Norfolk	4.15	....	....	....	....	4.50	4.50	4.75	5.50	....	....	....	....
Chicago	3.65	....	....	4.05	5.05	4.25	4.10	4.10	4.75	8.10	8.10	9 35	9 35
Milwaukee	4.099	4.899[1]	5.249	4.199	....	4.399	4.249	4.249	4 849	8.399	8 399	9.849	9 649
Cleveland	3 95	4 55	5 238	4.188	5.00	4 25†	4.311	4 10	4.75	8.358	8 358	9 35	9 35
Buffalo	4 15	4 85[1]	5.35	4.30	5.25	4.55	4.10	4.10	4 75	8.10	8 10	9 35	9 35
Detroit	4.05	4 85	5.42	4.34	5.24	4 49†	4.42	4.20	4 87	8.51	8 51	9 74	9 74
Cincinnati	3 916	4.716	5 168	....	....	4 553	4.444	4.403	5 053	....	....	....	....
St. Louis	3 999	4.799[1]	5.424	4.199	5.424	4.399	4.249	4.249	5.074	8.574	8.574	9 824	9 824
Pittsburgh	3.95	4 65[1]	5.10	4.05	4.95	4.25	4.10	4.10	4.75	8.10	8 10	9.35	9 35
St. Paul	4.284[7]	5 084[1]	5.434[2]	4.384[7]	....	4.584[7]	4.434[7]	4.434[7]	5 476[6]	....	7.084[6]	....	....
Omaha	4.768	6.118[1]	5 918	4.868	....	5.068	4.918	4.918	5 568	....	..	....	....
Indianapolis	3.84	4.84	5.29	4.24	5.01	4.51	4.38	4.56	5.01	....	..	....	....
Birmingham	4.15[11]		5.25	4.15[11]	....	4.35[11]	4.10[11]	4.10[11]	5.58	....	..	....	....
Memphis	4 32[11]	5.53[11]	5.97	4.72[11]	....	4 92[11]	4.67[11]	4.67[11]	5.78	....	..	....	..
New Orleans	*4 68[11]	5.94[1]	....	4.88[11]	....	5 03[11]	*4.73[11]	*4.83[11]	5.94[6]	....	..	....	....
Houston	5.00	....	8.36	6.00	....	5.85	5.85	5.35	6.25	....	..	....	....
Los Angeles	5.15	7 00[1]	6.70	5.65	8.35[5]	5.10	5.20	5.10	6.90[14]	10.15	9.35	11 05	11.05
San Francisco	4 70[8]	6.30[9]	6.45	5.20[8]	....	5.00[8]	4.90[8]	4.75[8]	7.00[10]	....	....	....	....
Seattle	4.80[4]	6.75[2]	6.30	5.30[4]	....	5.15[4]	4.95[4]	5.00[4]	7.10[14]	....	9 50[6]	....	10 85[6]
Portland	5.00[4]	....	6.25	5.50[4]	....	5.25[4]	5.10[4]	5.10[4]	7.20	....	9.30[6]	....	....
Salt Lake City	5.65	....	7.10	6.35	....	5.70	5.85	5.95	7.00	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 lb and over.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999; (8) 400 lb and over; (9) 450 to 1499; (10) 500 to 999; (11) 400 to 3999; (12) 450 to 3749; (13) 400 to 1999; (14) 1500 and over.

* Add 46¢ for sizes not rolled in Birmingham.

† Up to ¾ in. thick and 90 in. wide.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight.

BASING POINT PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	37.00	37.50	38.00	38.50	....
Birdsboro	40.00	40.50	41.00	41.50	45.00
Birmingham	32 88	33.38	....	....	....
Buffalo	35.50	36 00	36 50	....	....
Chicago	35.50	36 00	36.50	37.00	....
Cleveland	35.50	36.00	36.50	....	....
Duluth	36.00	36.50	37.00	37.50	....
Erie	35.50	36.00	36.50	37.00	....
Everett	....	45.00	45.50	....	....
Granite City	36 00	36.50	37.00	....	....
Neville Island	36 00	36.50	36.50	37.00	....
Provo	37 00	37.50	....	....	....
Sharpsville	36 00	36.50	36.50	37.00	....
Steelton	37.00	....	....	....	42.00
Struthers, Ohio	36.50	....	....	....	....
Swedeland	38.50	39.00	39.50	40.00	....
Toledo	35.50	36.00	36.50	37.00	....
Troy, N. Y.	37.00	37.50	38.00	38.50	42.00
Youngstown	36.00	36.50	36.50	37.00	....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$0.50 Arb.	....	45.50	46.00	....	....
Boston	Steelton	4.82					46.82
Brooklyn	Bethlehem	3.00	40.00	40.50	41.00	41.50	....
Brooklyn	Birdsboro	3.50	....	....	....	....	48.50
Cincinnati	Birmingham	4.87	37.75	38.25	....	....	....
Jersey City	Bethlehem	1.84	38.84	39.34	39.84	40.34	....
Jersey City	Birdsboro	2.33	....	....	....	....	47.33
Los Angeles	Provo	5.94	42 94	43.44	....	....	....
Mansfield	Cleveland-Toledo	2.33	37 83	38.33	38.83	39.33	....
Philadelphia	Bethlehem	1.67	38.67	39 17	39.67	37.17	....
Philadelphia	Swedeland	1.01	39.51	40 01	40 51	41.01	....
Philadelphia	Birdsboro	1.49	41.49	41.99	42.49	42.99	46.49
Philadelphia	Steelton	2.15	39 15	....	....	....	44.15
San Francisco	Provo	5.94	42.94	43 44	....	....	....
Seattle	Provo	5.94	42.94	43 44	....	....	....
St. Louis	Granite City	0.75 Arb.	36.25	37.25	37.25	....	....

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$45.50; f.o.b. Buffalo—$46.75. Add $1.00 to $1.25 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorous $44.00 per gross ton, f.o.b. Lyles, Tenn. Delivered to Chicago, $49.49. High phosphorous charcoal pig iron is not being produced.

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Less ton lots (packed)	157.00
Delivered Pittsburgh	140.25

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Briquets—Cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	7.00	7.25	7.80
Ton lots	8.00	8.60	10.50
Less ton lots	8.40	9.00	10.90

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$43.00	$44.00
F.o.b. Pittsburgh	47.00	48.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	30
L.c.l. lots	32

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.06% max. C, 0.06% P, 90% Mn	21.00	22.10	22.70
0.10% max. C	20.50	21.60	22.20
0.15% max. C	20.00	21.10	21.70
0.30% max. C	19.50	20.60	21.20
0.50% max. C	19.00	20.10	20.70
0.75% max. C, 7.00% max. Si	16.00	17.10	17.70

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.65
Ton lots	7.70
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet	6.75
Ton lots	7.75
Less ton lots	8.15

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $69.00 f.o.b. Keokuk, Iowa; $70.00 f.o.b. Niagara Falls. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add 50¢ per ton for each 0.50 pct Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe	16.50	17.85	19.60
97% Si, 1% Fe	16.00	18.25	20.00

Ferrosilicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si. 1 lb Si briquets.

	Eastern	Central	Western
Carload, bulk	4.25	4.50	4.70
Ton lots	5.25	5.85	6.15
Less ton lots	5.65	6.25	6.55

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	15.00	15.65	15.90
50% Si	7.80	8.30	8.50
75% Si	10.00	10.30	11.05
80-90% Si	11.30	11.60	12.35
90-95% Si	12.80	13.10	13.80

Ferrochrome (65-72% *Cr, 2% max. Si*)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	23.00	23.40	24.00
0.10% C	22.50	22.90	23.50
0.15% C	22.00	22.40	23.00
0.20% C	21.75	22.15	22.25
0.50% C	21.50	21.90	22.00
1.00% C	21.00	21.40	21.50
2.00% C	20.50	20.90	21.00
65-69% Cr, 4-9% C	15.60	16.00	16.15
62-66% Cr, 4-6% C, 6-9% Si.	16.60	17.00	17.15

Briquets — Contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	9.85	10.10	10.20
Ton lots	10.75	11.65	12.25
Less ton lots	11.15	12.05	12.65

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chrominum contained, lump sie, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	16.70	17.10	17.25
Ton lots	17.90	19.20	20.00
Less ton lots	18.60	19.90	20.70

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	21.00	21.40	21.50
Ton lots	22.35	23.00	24.20
Less ton lots	23.35	24.00	25.20

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, f.o.b. shipping point, freight allowed, 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0 20% max. C	83.50	85.00	86.25
0.50% max. C	79.50	81.00	82.25
9.00% min. C	79.50	81.00	82.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	14.00	14.50	16.55
Ton lots	16.10	16.85	19.00
Less ton lots	17.10	17.85	20.00

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	15.50	16.00	18.05
Ton lots	17.60	18.45	20.20
Less ton lots	18.60	19.45	21.20

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

	Cast Turnings	Distilled
Ton lots	$1.60	$2.35 $2.95
Less ton lots	1.95	2.70 3.75

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

	Eastern	Central	Western
Ton lots	16.00	17.10	19.05
Less ton lots	16.75	17.85	19.80

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

	Eastern	Central	Western
Ton lots	14.25	15.35	17.30
Less ton lots	15.00	16.10	18.05

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, f.o.b. plant Niagara Falls, Washington, Pa. York, Pa., per pound contained W, 5 ton lots, freight allowed.. $2.50

Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.

Openhearth	$2.70
Crucible	$2.80
High speed steel (Primos)	$2.90

Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2O_5 $1.10

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb

Ton lots	$2.50
Less ton lots	$2.55

Ferromolybdenum, 55-75%, f.o.b Langeloth, Washington, Pa., per pound contained Mo. 95¢

Calcium molybdate, 40-45%, f.o.b Langeloth, Washington, Pa., Per pound contained Mo. 80¢

Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo. 80¢

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo. 80¢

Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y. ton lots, per pound contained Ti $1.23

Less ton lots $1.25

Ferrotitanium, 20-25%, 0.10% C max., ton lots, per pound contained Ti $1.35

Less ton lots $1.40

High carbon ferotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton.... $142.50

Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. (Siglo) Tenn., $3 unitage per gross ton $65.00

Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.

Carload lots 17.00¢

Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy

Carload, bulk 5.50¢

Alsifer, 20% Al, 40% Si, 40% Ft, contract basis, f.o.b. Niagara Falls, carload 6.25¢

Ton lots 6.75¢

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound

Car lots	9.00¢
Ton lots	9.75¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed.

Ferroboron, 17-50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots	$1.30	$1.3075	$1.329

Manganese — Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.044

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$2.10	$2.1125 $2.1445

Silcaz, contract basis, f.o.b. plant freight allowed, per pound.

Carload lots 35¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.

No. 1	87.5¢
No. 6	60¢
No. 79	45¢

Bortram, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Carbortam, f.o.b., Suspension Bridge, N. Y., freight allowed, Ti 15—17%, B 0.90—1.15%, Si 2.5—3.0% Al 1.0—2.0%.

Ton lots, per pound 8.0¢

Iron and Steel Committee of ILO to Meet in Sweden Aug. 19

Washington

• • • **Another step** toward their goal of standardizing labor conditions in the iron and steel industry throughout the world will be taken by the Iron and Steel Committee of the International Labor Organization at the second meeting of the group to be held at Stockholm, Sweden, on Aug. 19.

Maintenance of production and employment at high levels; minimum income security (annual and other wage systems designed to provide assured earnings); labor - management cooperation; and a general report dealing with actions taken at the first meeting held in Cleveland last year make up the agenda of the meeting next month. The following nations are members of the committee: United States, Australia, Belgium, Canada, China, France, United Kingdom, India, Italy, Luxembourg, Mexico, Sweden, Czechoslovakia, and the Union of South Africa.

At the Cleveland meeting all the member countries, except Mexico and Czechoslovakia, sent tri-partite delegations representing government, management and labor. It is hoped that all member countries will be represented at the Stockholm meeting.

It will be remembered that at the Cleveland meeting last year, subcommittees on full employment, industrial relations and safety were appointed. These subcommittees put their stamp of approval on many proposals and the meeting next month will hear a report on actions taken in the various countries to give effect to the decisions of the first meeting and also a report on steps taken by the International Labor Office to follow up the studies and inquiries proposed by the Committee.

A brief outline of the recommendations of the three subcommittees follows:

Full Employment—Studies were recommended on the following subjects: Fuel shortages, wage schemes, purchasing policies of consumers, technological changes, and industrially underdeveloped countries. It was also recommended that the ILO collect adequate statistics relating to employment and economic problems underlying social problems in the iron and steel industry.

Steps Toward Standardizing World Labor Conditions Placed on Agenda

o o o

Industrial Relations—Three resolutions were approved favoring freedom of association, collective bargaining, and the observance of collective agreements. It was also recommended that the ILO conduct a series of studies on various aspects of industrial relations.

Safety—This subcommittee recommended that the ILO undertake the preparation of a study on accident prevention in the form of a factual survey of the various measures taken in the different countries for the prevention of accidents and the protection of health in the iron and steel industry. The group also recommended the establishment of joint employer-employee groups in all plants to work toward the goals mentioned above.

The iron and steel committee along with others dealing with building, civil engineering, and public works, coal mining, inland transport, metal trades, petroleum production and refining, and textiles, was set up to provide a means of thrashing out specific world problems in these key industries. This was deemed necessary because the International Labor Conference, the world parliament of the parent organization, meets only once a year.

The ILO itself is represented in the various committees by a tripartite delegation from the governing body of the ILO. This group is responsible to the governing body and reports the recommendations of the committees to the governing body. The decisions of the committees may be submitted to the International Labor Conference in the form of conventions for ratification at the annual meetings of the ILC. If they are ratified by the ILC they must in turn be accepted by the member nations before they become binding. If a nation accepts a convention, the government is

ELECTRICALLY WELDED WHEEL: *Exhibited at the Milan, Italy, trade fair is this aluminum wheel. In this specific installation it is being used as a windmill. The trade fair is showing postwar industrial developments from all over the continent.*

bound to apply it and to submit an annual report showing how it is applying it.

While the stabilization of working conditions throughout the world is impossible in many countries at the present time, due to enormous reconstruction problems, the ILO recognizes that this must be done if the freer world trade visualized by the United Nations is to materialize.

The ILO is rather unique in that it is the only one of the specialized agencies of the old League of Nations that has survived. It has recently been taken into the United Nations setup, and its revised constitution passed the Senate without major opposition. The Senate also agreed to a larger U. S. contribution to the budget of the organization. Always assured of strong U. S. support, the ILO in its revised constitution has made it easier for this country to carry out the decisions of the body. It is now possible for the individual states to act on matters approved by the ILO which are deemed to be outside the jurisdiction of Congress.

Since the first conference in 1919, the organization has adopted 67 conventions (requiring a two-thirds majority of the group) and 73 recommendations. These deal with hours of work, paid vacations, the protection of women and children, prevention and compensation of industrial accidents, insurance against unemployment, sickness, old age and death, colonial labor problems, conditions of seamen, and many others.

Since congressional approval has been required many of these decisions have not been put into effect in the United States. Due to the high standard of American labor it has not been necessary from a practical point of view to make some of these decisions binding on the United States, but from a moral standpoint, U. S. sanction is extremely helpful. The new constitution will now enable this country to lend greater support to an organization that it has always backed with enthusiasm.

Foundry Layouts And Labor Utilization In Germany Called Poor

Washington

• • • **Details on** manufacturing operations utilized by the German iron castings industry are contained in two reports now on sale by the Office of Technical Services, Dept. of Commerce.

The reports, believed to be of interest to the American iron castings industry, are based on visits to 38 German foundries and factories by two teams of investigators of the British Intelligence Objectives Subcommittee.

The first report is concerned with centrifugal castings as used in the production of cast iron pipe, cylinder liners and piston rings; the second gives details on the light castings industry manufacture of such items as bathtubs, cookers and other building accessories. The reports include descriptions of melting and cupola practices and information on tuyeres, sand equipment, methods of core drying, and enameling.

The team investigating the centrifugal castings industry found that the bulk of German cast iron pipe was produced in three plants. Two of the plants employed the normal Delavand process; the third used the sand spun process. Practices of the three plants are described.

Detailed descriptions are presented on cast iron and steel cylinder liners produced in chill molds on horizontal axis centrifugal machines, cast iron cylinder liners produced on horizontal axis machines in sand lined molds, and steel castings produced on vertical axis machines in sand molds and in chill molds to show variation from British practice.

The team investigating the light castings industry found that German plant equipment and the products of some plants were good, but that plant layout and labor utilization were poor.

In the foundries visited most of the melting was carried out in cupolas although some use was made of small electric furnaces in the bigger works for small experimental melts and for special-purpose irons. There were also several light castings factories which had been fitted with side-blown

converters for the production of steel and cast steel shells in permanent molds.

An unusual tuyere arrangement was found at the Deutsche Eisenwerke at Hilden. The plant had four large tuyeres approximately 14 x 16 in. which were reduced in size to about 6½ x 16 in. by heaping sand on the floor of each tuyere. Each tuyere communicated with an independent windbox on the outside of the cupola, about 36 in. high x 16 in. wide x 12 in. deep.

Mechanical charging of various types of furnaces was widely employed in Germany and seemed to be efficiently carried out, the report states.

Orders for the reports, PB-63856 *The German Centrifugal Castings Industry;* 90 p., drawings; microfilm, $2; photostat, $6; and PB-65665, *Manufacture of Light Castings (Baths, Cookers, Etc.) in Germany;* 141 p., photos, diagrams, tables; microfilm, $3; photostat, $10 should be sent to the Office of Technical Services, Dept. of Commerce, Washington 25, D. C., and should be accompanied by check or money order, payable to the Treasurer of the United States.

ALUMINUM DRUM: *The 30-gal aluminum drum just announced by Reynolds Metals Co. was designed specifically for shipping hydrogen peroxide. It meets Interstate Commerce Commission specification 42D.*

Weekly Gallup Polls

[CONTINUED FROM PAGE 119]

coal mines. The Atlee government has been moving toward these goals.

This nation has lagged behind Britain in enacting social legislation. Unemployment insurance took full effect in England two decades before the New Deal era. The British instituted old-age pensions in 1908, and have had national health insurance since 1911. The all-inclusive Beveridge Plan, guaranteeing security from womb-to-tomb, becomes fully effective next year. Thus, the average English voter is more acclimated to social legislation of various kinds than is his counterpart in this country.

The United States enjoys a productive capacity that continues to upset expert predictions. Just a short while ago, pleas were heard for governmental action to create 60 million jobs. That figure already has been surpassed.

Railroads Report Bad Shipping Situation

Washington

• • • **Gravity of** the shipping situation and indication that it is getting no better is emphasized in the latest report of the Assn. of American Railroads which reveals that Class I roads retired 5183 more freight cars than were placed into service during the first 6 months of 1947.

Class I roads put 20,735 new freight cars into service during the 6-month period, of which 5249 were installed during June, according to AAR, as against retirement of 25,918 for the same period. Of these, 5356 were taken from service in June, making the month's net loss 109.

At the same time, it was announced that the number of new freight cars on order as of July 1 amounted to 109,556 as compared with 101,980 on June 1, an increase of 7576.

During the first half of 1947, the railroads also put in service 418 new locomotives, including 354 diesels and one electric; orders for locomotives still on order as of July 1 amounted to 794 of which 765 were diesel, 24 were steam and five were electric.

Need For Sound Ingot In High Temperature Forging Is Described

Schenectady

• • • **The necessity for** sound ingots to obtain satisfactory forging characteristics in high-temperature materials has been described at the June meeting of the American Society of Mechanical Engineers by L. B. Fonda of General Electric's laboratory at Lynn.

The investigations were made in connection with production of parts for the aircraft gas turbine, Fonda reported, but the results will undoubtedly be of value in other forging problems where high-temperature alloys are involved.

On the gas turbine forgings, the G-E scientist said, it was found that the most important consideration was high ductility. Sound ingots proved to be the best means of assuring this.

If the ductility was good, minor defects did not materially affect the bursting speed of the wheels, Fonda continued. Adequate control over grain flow within the forging proved to be the greatest step forward in obtaining high overall ductility in the plane of maximum stress, he said. The proper use of solution treatment seemed to be indicated as an additional step in this direction. Finally, conscientious use of the proper combination of inspection procedures, was an extremely important factor, Fonda said.

The research described by Fonda involved bursting tests on 179 turbine wheel blanks and 6 completely bucketed wheels.

In the metallurgical testing, it was found that the center of the roating wheel was the critical area and not the rim, and that the quality of the center area was much more difficult to control in a large forging than in a small one. From this it was concluded that the ductility was the most important factor contributing to high and consistent bursting speeds.

With grain flow and grain refinements so important in ductility, Fonda continued, investigations were then made into each method of manufacturing the various blanks. For example, it was found that in those made by the "center reversal process," in which the billet

stage is eliminated, that while t
total amount of grain refinem
was at least comparable to that
tained by conventional forging,
kneading formed the flow lines i
the positions most advantage
for operating conditions.

The solution treatment found
fective consisted of heating
metal to a temperature sufficier
high to dissolve the carbides
intermetallic compounds in an a
tenitic solid solution. Temperatu
ranged from 2100 to 2500F,
forgings were held at that tempe
ture for at least an hour to al
time for the solution to take pl
In addition to increasing ductil
solution treatment also tends
equalize the variable conditions
to poor control over the finish
temperature during hot w
Fonda reported.

It was also indicated that s
tion treatment used in conjunc
with certain beneficial factors
good processing is necessary
good bursting speed, and not s
tion treatment alone it was poi
out.

Regarding the practices used
the production and inspection
the best type blanks, Mr. Fo
detailed the various effective p
tices. Some vendors used an e
tric arc to keep ingot hot
molten until the body of the i
solidified, thereby improving
soundness of the metal. Anot
supplier eliminated the billet s
entirely, thereby doing away
a serious source of defects. S
vendors developed special in
mediate dies for preliminary u
of the billets, which not only
vented twisting but also helped
the metal at the ends of the bil
thereby providing better grain
finement. In delivering only
press blow per forging heat,
vendor kept the metal hot and
cessfully avoided forging defe
he said.

The inspection technique use
cluded both Zyglo for surface
fects and etched cross sections
the discovery of poor center co
tions. Supersonic inspection of
lets was used to some extent
was not a regular production t
nique, Mr. Fonda concluded.

Dravo Corp. Develops Steel, Weathertight Shipping Containers

Pittsburgh

• • • **To facilitate** loading and unloading operations and minimize breakage and pilferage of merchandise shipped by ocean-going and lake vessels, river barges, railroad cars and some motor freight carriers, Dravo Corp., Pittsburgh, has developed a 277-cu ft welded steel, interlocking weathertight shipping container.

Use of the Dravo shipping container is expected to help solve the serious problems of pilferage and increased cargo handling costs. The latter are reported currently to be a third to two thirds higher than before the war.

In a trial shipment of 12 containers of this type between an east coast port and Puerto Rico, material handling costs were said to be reduced approximately 70 pct of the cost when cargo is handled by customary methods. Tiering expense was cut about 90 pct; dock watching charges and checking and clerking costs were eliminated.

With a shipping container, shippers can supervise loading and unloading of merchandise on their own premises and give the carrier a locked or sealed package which is then handled as a single unit instead of an assortment of individual crates or cartons. The significance of this advantage is emphasized by the fact that damage and pilferage claims against freight steamship lines have risen to as high as 9 pct of gross revenue. One insurance underwriter reduced its base rate 50 pct for goods shipped in steel containers.

Rimmed Steel

(CONTINUED FROM PAGE 69)

practice is somewhat higher per ton than in the openhearth. Although the heat times in the electric furnace are shorter, the tonnage per heat is less. The reason for switching to the electric is due to pressing steel demands. Available electric melting facilities are much larger than needed for peacetime business and have been called on to supplement the production of openhearth steels which are in greater demand than conventional facilities can supply.

Combination Boring And Milling Machines Developed by Germans

Washington

• • • **Combination boring** and milling machines and swivel head vertical milling machines were two of the very few new machine tools developed by the Germans during the war according to a report on German machine tool practices now on sale by the Office of Technical Services, Dept. of Commerce.

The report was made by OTS investigators L. E. Mehlhope, and L. H. Martin, field engineers of the Cincinnati Milling & Grinding Machine Co., of Cincinnati, and Landis Tool Co. of Waynesboro, Pa., respectively. They visited 26 German machine tool manufacturers of lathes, grinders and milling machines.

The combination boring and milling machines were made to increase precision and save resetting of the work. Work was moved from one set of cutters to another. The cycle was not simultaneous but successive. The investigators found swivel live spindle headstocks and swivel wheel heads on grinding machines to be more versatile than U. S. models although not as rigid or productive.

In the grinding field, the investigators noted a tendency to build machines with low power for a designated work swing. Ten-inch grinders, for example, would have range for full 10 in. but power, weight and grinding wheel capacity would be more nearly comparable to our 6-in. grinders.

Profile milling seemed to have been neglected in Germany until the war started, the report states. Most of the milling machines were made by Rhorschach in Switzerland.

The investigators found no independent development of automatic die sinking. Broaching was little used and not at all on cast iron. Where broaching was used, the applications were good and compared favorably with U. S. practice, the report states.

At the Gerb Heller Machinenfabrik at Nurtingen the investigators found a giant machine for turn milling the crank pins and adjacent web faces of diesel motor crankshafts. Since the crankshafts were large, it was necessary to use

a 40-in. diameter cutter. Plant personnel claimed that the machine, estimated to weigh from 150,000 to 200,000 lb, could finish a crankshaft in 24 min compared with 160 min by previous turning methods.

In the turn milling operation the crankshaft is mounted between centers and supported additionally by journal rests on two finished main bearings. Six cutters mounted on spindle carriers are spaced at intervals of 120° about the axis of the crankshaft. Two of the cutters are located vertically under the crankshaft and two on each side of the shaft 30° above the horizontal. Each spindle carrier is slide mounted on a saddle so that it can move the cutter to and from the work axis to feed the cutter to the work. The saddles are adjustably mounted on the bed in order to space the cutters axially for different lengths of crankshafts.

As the crankshaft rotates any pin describes a circle in space and in order to maintain contact between work and cutter, the spindle carriers move to and from the work axis. Movement is controlled by hydraulic tracing. A master cam mounted on the work headstock spindle engages tracer heads operating from each spindle carrier.

One of these giant Heller milling machines, found at the Maschinenfabrik Alfind at Wasseralfingen, was still being demonstrated by Heller technicians, and was not in production when the war ended.

The investigators found that the Germans did not make appreciable progress on high speed negative rake milling, which was developed during the war in the United States. Technicians of the Loewe establishment in Berlin told about experiments which indicated that the Germans might have solved this problem. Several experimental machines are noted in the report.

Orders for the report (PB-63855; *Machine Tool Practice in Germany*, photostat, $6; microfilm, $2; 78 p.) should be addressed to the Office of Technical Services, Dept. of Commerce, Washington 25, D. C., and should be accompanied by check or money order, payable to the Treasurer of the United States.

Need New Exploration, Development for U. S. Minerals Resources

Washington

• • • **While there** undoubtedly are considerable quantities of additional mineral reserves to be found in unexplored territory of the United States, an intensive program of study, exploration and development will be necessary to determine their actual extent.

This is the conclusion drawn in a report of the hearings held by a special subcommittee of the Senate Public Lands Committee and represents largely a condensed study recently completed by the Bureau of Mines and the Geological Survey.

Tables compiled by the committee portray the nation's mineral resources position largely on the basis of well-known ore deposits or locations where exploration has been sufficiently extensive to obtain a reasonable measurement of the deposits.

"In the main," the report states, "we have developed the deposits that nature has exposed or for which there have been surface indications to give clues to the presence of ores. Natural forces, however, have not exposed all the mineralized zones . . . Probably not more than 10 pct of the surface of the United States has been covered by systematic geological mapping on a scale large enough to provide a satisfactory basis for search for hidden mineral deposits."

On the basis of information available, there are some mineral reserves in such quantities as to occasion no worry for many years to come. For instance, at the current rate (1935-44) of consumption, magnesium resources are virtually unlimited and there are enough bituminous coal reserves to meet all needs for 4400 years and anthracite, for 187 years, and enough molybdenum for 157 years. Known iron ore reserves are sufficient for at least 76 years.

Current consumption of cobalt would exhaust the supply in about 53 years but at the present production rate the fields would not be exhausted for 674 years. In the titanium ores, reserves of rutile are estimated at 814,000 tons, or enough for 124 years at present rates of

use; ilmenite reserves are set at 17.4 million tons, sufficient for 73 years.

In a number of instances, it is pointed out, such as in the case of iron ores, technological improvements of various kinds are making or will make it possible to use progressively lower grade deposits; in others, scientific progress will make more substitutes available. Improvement in material and equipment will decrease mining costs and increase recovery.

On the other hand, the United States is completely dependent, or nearly so, on foreign sources for chromite, nickel, platinum metals, ferromanganese, tin, and industrial diamonds. There is indication that the cobalt position may be improved through new discoveries but there is little expectation that new domestic sources of tin, platinum, industrial diamonds or quartz crystals will be found. Nor is there much hope of improving the present position in antimony, vanadium, high-grade bauxite or strategic mica, for all of which the United States is partially dependent on foreign sources.

Estimated Mineral Reserves of the United States

Minerals	Reserves in Tons	Years' Consumption
Fluorspar	9,000,000	33
Bauxite	36.5 million, available alumina	23
High-alumina clay	675 million, available alumina	
Alunite	1 million, available alumina	
Zinc	11.2 million in recoverable zinc under normal economic conditions, plus 4,000,000 under more favorable conditions, plus 1,700,000 for emergency prices.	20
Copper	20,000,000 in recoverable copper, plus 10,000,000 in marginal deposits	19
Gold	69,000,000 troy oz	19
Silver[1]	763.4 million troy oz	13
Cadmium[1]	100 million lb recoverable cadmium	11
Lead	5.3 million in metallic lead available under normal economic conditions, plus 1.1 million under more favorable conditions, plus 0.2 million under emergency prices.	10
Manganese	0.5 million in metallic manganese available under peacetime conditions; 2 million under conditions similar to 1944; 50 to 75 million under conditions of dire need	4
Platinum metals	600,000 troy oz	3
Antimony[1]	104,000 in metallic antimony	3
Vanadium	On the basis of geologic studies the total amount of vanadium in domestic deposits is thought to be large. Because of sporadic distribution of the deposits and their range in size, the practice of operators is to extend exploration and development only a relatively short distance ahead of mining faces. For this reason reserves in the usual sense are relatively small	8
Tungsten	117.6 million lb contained tungsten at $30 or less per unit of WO_3	2
Mercury	Reserves of U. S. and Alaska in flasks of 76 lb: 86,000 flasks at $100 a flask; 330,000 flasks at $195 a flask; 481,500 flasks at $300 a flask	2
Tantalum[1]	195,000 lb of recoverable tantalum under conditions prevailing in 1944	—
Chromite	2 million (only approximately 10,000 available under peacetime conditions)	0
Tin	7,000 in metallic tin (5,000 are in Alaska)	Negligible
Graphite (flake)	150,000 to 215,000 (fine graphite reserves are 800,000 to 840,000)	Negligible
Mica (strategic)	Indicated reserves at $6 a lb are about 2 million lb and 30 to 40 million lb of inferred reserves	Negligible
Quartz crystal	No domestic deposits of sufficient size and quality to meet present specifications	Negligible
Diamonds (industrial)		Negligible
Nickel[1]	550,000	Negligible

[1] Obtained chiefly as byproducts. Output dependent on rate of production of associated metals.

Ryan Aeronautical Buys Navion Rights

San Diego

• • • **Ryan Aeronautical** Co. has purchased North American's four-place personal plane, the Navion. The deal, recently consummated, includes engineerings, design, and all production fixtures. Ryan plans to go into production within 60 to 90 days. The San Diego plant is being set up for a capacity of up to ten planes daily.

An estimated 500 12-ton truck loads will be required to move equipment and materials from the North American plant in Inglewood to San Diego.

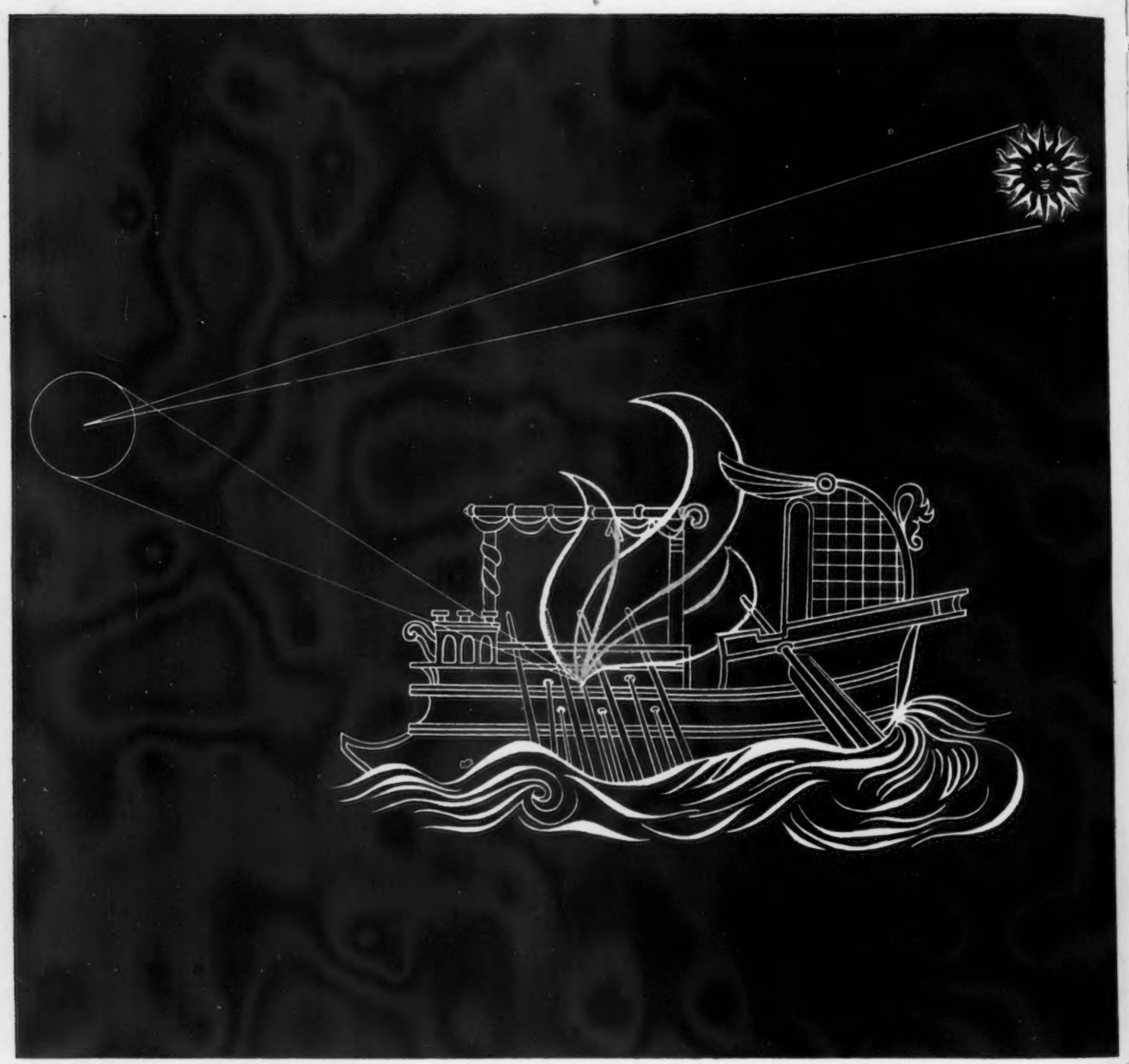
Ryan spokesmen said contemplated production and sales costs at this time indicate Ryan will maintain the $7750 f.a.f. price.

IT ISN'T DONE WITH MIRRORS—TODAY

When the Roman fleet tried an amphibious operation at Syracuse, they ran into a problem of high temperature condition that completely nonplussed them. Archimedes, according to legend, burned them up by focusing the sun's rays on them with mirrors.

Modern problems of operation at high temperatures are solved quite simply by using molybdenum steels. Their creep strength and excellent properties at elevated temperatures assure good performance when the heat is on.

We will be glad to send detailed information concerning the types of molybdenum steel suitable for operation at elevated temperatures.



MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"
CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

Climax Molybdenum Company
500 Fifth Avenue - New York City

MOLY

Talide
(TUNGSTEN CARBIDE)
Cutting Tools

stock immediately available

Talide TOOLS AND TIPS ARE AT YOUR FINGERTIPS

We carry complete stocks of standard Talide Tools and Tips at the following warehouses. Call them for fast service:

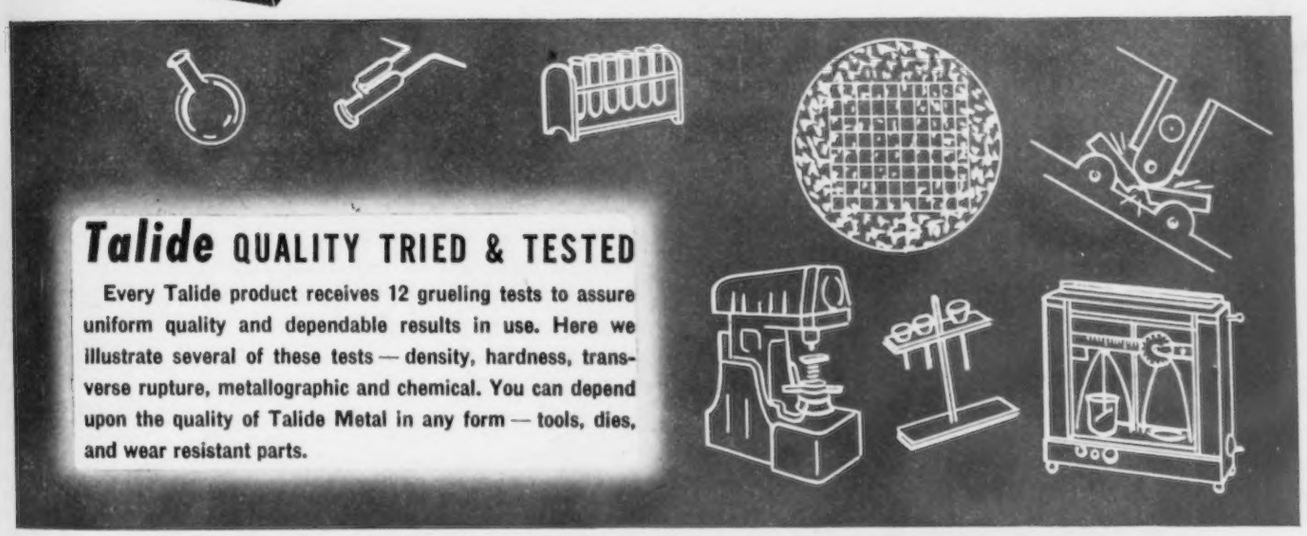
Newark, N. J., 166 Bloomfield Ave.
Youngstown, Ohio, 107 E. Indianola Ave.
Chicago, Ill., 601 W. Milwaukee Ave.

We also have Talide sales engineers in the following territories who will be glad to assist you in any phase of tungsten carbide application, or in obtaining stock: Newark, Pittsburgh, Cleveland, Detroit, Indianapolis, and Chicago.

WHY PRODUCTION MEN USE *Talide* CUTTING TOOLS

Talide Tools remove metal 2 to 3 times faster than the fastest tool steel. Made from the hardest man-made metal, they wear much longer, and only require infrequent redressings. You can use Talide Tools for machining all kinds of steel, cast iron, non-ferrous metals and non-metallic materials.

Send for engineering-style catalog 46-T "Standard Talide Tools and Tips."



Talide QUALITY TRIED & TESTED

Every Talide product receives 12 grueling tests to assure uniform quality and dependable results in use. Here we illustrate several of these tests — density, hardness, transverse rupture, metallographic and chemical. You can depend upon the quality of Talide Metal in any form — tools, dies, and wear resistant parts.

SINTERED CARBIDES — MC TALIDE — HOT PRESSED CARBIDES

METAL CARBIDES CORPORATION

YOUNGSTOWN 5, OHIO *Pioneers in Tungsten Carbide Metallurgy*

CUTTING TOOLS · DRAWING DIES · WEAR RESISTANT PARTS

Fatigue Cracks

BY C. T. POST

Oasis

• • Reese Price who formerly helped guide U. S. Steel's advertising destinies has moved from Rye, N. Y., to Bourbon, Ind., to buy, of all things, a newspaper. If things don't work out there, he can always try Scotch Plains, N. J., Brandy, Va., Beerston, N. Y., or Winesburg, O. But they're all too far, in our sissified estimation, from Soda Springs, Calif.

Postman's Pal

• • The other day when we were sniffing through the pet advertisements we came across a For Sale item on some springer spaniel puppies which wound up the usual discourse on sires and bitches with a note that the pups had "unusually soft mouths." The doggy set turns a cool nose to us outlanders so we don't know quite whom to ask about this. It seems, though that a little scientific inbreeding might produce a soft-mouthed strain that would put an end to chewed-up sofa cushions, patched britches and "Beware of the Dog" signs. If we tipped off the post office department about this, they might even deliver your favorite family journal free out of gratitude.

Problem Man

• • John Anthony, IRON AGE'S Eastern editor, is much relieved that radio's expert on family relations is strumming more lightly on the public heartstrings. The similarity in names between our John and radio's John J. is purely coincidental, but it has caused no end of confusion in IRON AGE'S family relations. Our John, with his storehouse of metalworking knowledge, would have been a natural for the Reader Service Department, but we couldn't let him lift the phone and say, "This is John Anthony. And what is your problem?" And he's completely frustrated from ever approaching Macy's complaint counter where they might bounce back at him with an evil smile, "And what is *your* problem, Mr. Anthony?"

Aptronyms

• • We almost broke a leg when we learned about it, but around the corner on Park Ave. there's a Dr. Splint.

There's never been any indication before that aptronyms were telepathic but the other day H. Clarendon Ions of Dallas wrote in for a copy of your f.f.j. just after we'd been boning up on electroplating.

Hands Across the Sea

• • Your favorite family journal is expecting a check from the Carnegies any day now for its part in furthering international friendship. You will recall that the October 17, 1946 issue contained a letter from Monsieur R. G. Mignot, workshop manager for F. Fillod F.S.A., St. Amour, France. M. Mignot outlined an impressive background in stamping and welding and said he would like to correspond with an American engineer with mutual interests. This dart from St. Amour (that's one French word we know) went straight to the heart of Daniel H. Spofford, assistant factory manager for The Wiremold Co., Hartford, Conn. A spirited correspondence began. Mr. Spofford brought M. Mignot up to date on American know-how and M. Mignot sent articles, books and information on French methods to Hartford. Mr. Spofford evidently was cut out to be an ambassador, though, for he tells us now that M. Mignot would like to come across the pond.

Our Own Classifieds

• • There's a three line sermon on extended deliveries in the Winnetka, Ill., *Talk* that makes us shiver for some of those plants held back by lack of steel:

> FOR SALE. NEW ELECTROLUX. JUST delivered. Had to get another cleaner during 4-mos. wait. Winnetka [redacted]

In our crystal ball we can see the classified columns next Spring jammed with notices like "*For Sale, 1948 Chevrolet, just delivered. Had to get a horse during 3 year wait.*" The customers are getting restless already.

But we're cheered up about the help problem by a Situation Wanted in the same paper:

> REFINED BONE-HEADED WHITE Dum Clucks want whole filthy house to clean. Strong backs, can't read, hear or smell. Will do every inch clean and work hard when owner is away—own equipment. Nobility references. Need no supervision. Phone Wilmette [redacted] before 9 a.m.

Noblesse oblige!

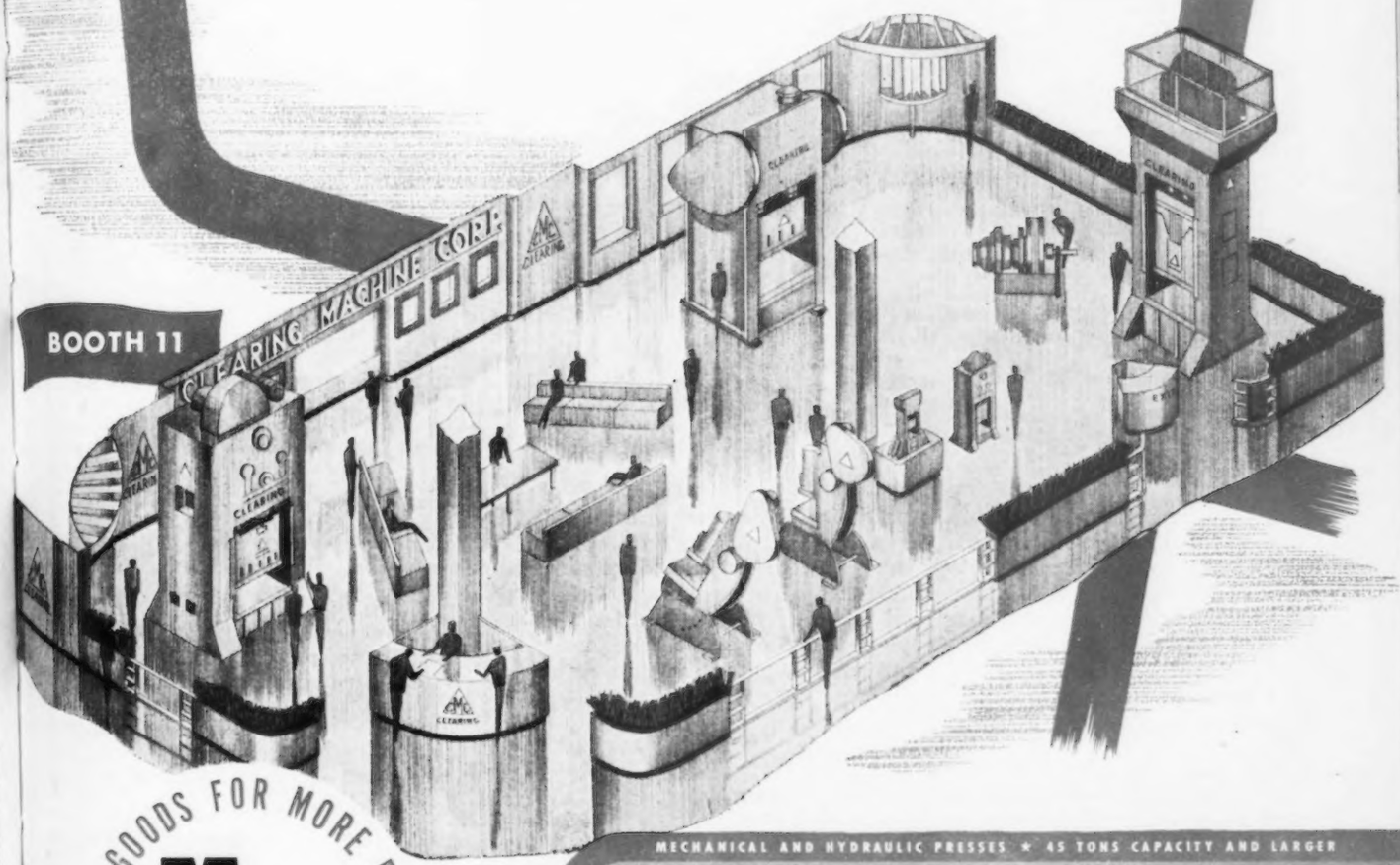
ACRES OF IDEAS

for Cutting Production Costs

The Machine Tool Show in Chicago September 17 to 26 affords an unparalleled opportunity to see and compare ways and means to reduce the cost of producing the things the world needs for better living. No industrial executive with his eye on the markets of tomorrow can afford to miss the information, the new ideas, and the practical examples so conveniently gathered together under one roof.

Clearing Machine Corporation is prepared to make its share of the show particularly worth while to those interested in producing large quantities of anything in metal or certain other materials. Clearing presses of various sizes, mechanical and hydraulic, will be there for examination—but equally important, Clearing engineers will be on hand during all show hours to talk about your specific needs and problems.

Even if you hadn't thought of *presses* as a means to lower your production costs, it might pay you to drop into Booth No. 11 while you're at the show.



MORE GOODS FOR MORE PEOPLE · AT LOWER COST ·

MECHANICAL AND HYDRAULIC PRESSES ★ 45 TONS CAPACITY AND LARGER

CLEARING

THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION

6499 WEST 65TH STREET • CHICAGO 38, ILLINOIS

Dear Editor:

SPAULDITE

Sir:

We have an inquiry for a material known as "Spauldite Metal #AA." Have you ever run across anything of this nomenclature?

R. H. HALLAGAN
Firth-Sterling Steel Co.
Detroit

● Spauldite laminated phenolic plastic in a grade known as AA is manufactured by the Spaulding Fibre Co., Inc., Tonawanda, N. Y.—Ed.

THE ONE-WAY DOLLAR

Sir:

I have had occasion to read the editorial, "The One-Way Dollar," by T. W. Lippert, in the May 29 issue. This editorial certainly hits hard and clearly at a major fallacy in some of the hasty thinking about our foreign trade. It should help materially in dispelling the illusion at which it is aimed.

W. L. THORP
Assistant Secretary
Dept. of State
Washington

PRECISION CASTING SURVEY

Sir:

We shall greatly appreciate it if you will kindly send us two copies of the article "Survey of Precision Castings" which appears in the April 1947 British publication *Metallurgia*, as described on p. 46 of the July 17 issue of THE IRON AGE.

P. F. NYDEGGER
Superintendent
Singer Mfg. Co.
Elizabethport, N. J.

● A request directly to *Metallurgia*, 31 King St. West, Manchester 3, England, will be promptly honored, or photostatic copies may be obtained from the Engineering Societies Library, 29 W. 39th St., N. Y.—Ed

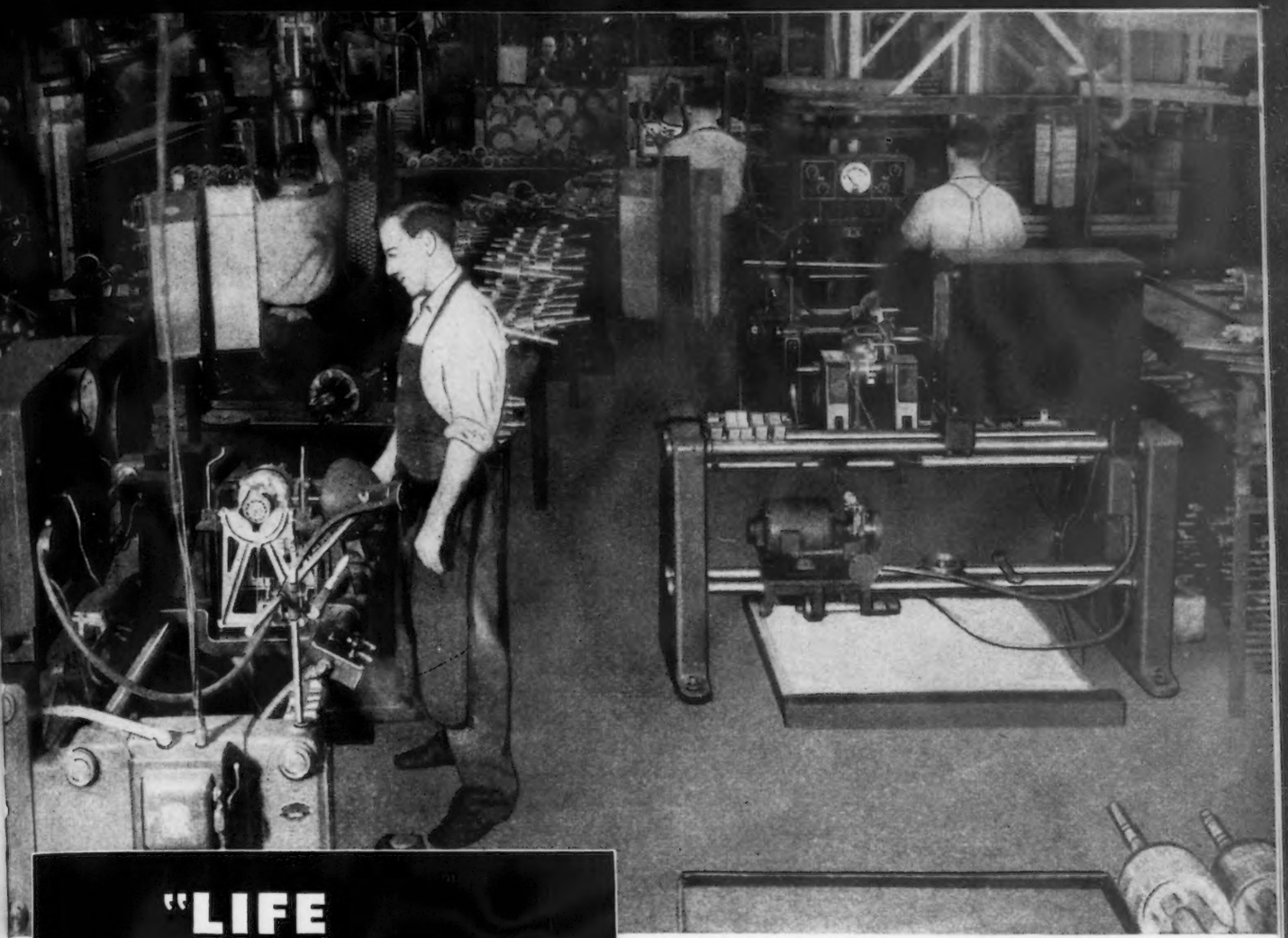
ELECTROLYTIC IRON

Sir:

What is the approximate tonnage of unannealed electrolytic (325 mesh and coarser) as quoted in your market columns? If this market is of any consequence, in what industrial fields is it used and where may specifications be obtained? Any information that you can furnish will be appreciated.

J. P. OLIVER
Chemical & Metallurgical Specialties Dept.
National Carbon Co., Inc.
Cleveland

● There is only one producer of unannealed electrolytic iron powder. The following may give some idea of the market situation. With four new plants going into production it has been estimated that the total production of all grades of iron powder including Swedish imports will soon reach 40 tons a day. Present consumption rate of all grades is estimated to be at the rate of 8



"LIFE INSURANCE"

for electric motors

Gisholt DYNETRIC* Balancing Machines† increase the life expectancy of electric motors by eliminating the most common cause of failure—*vibration.*

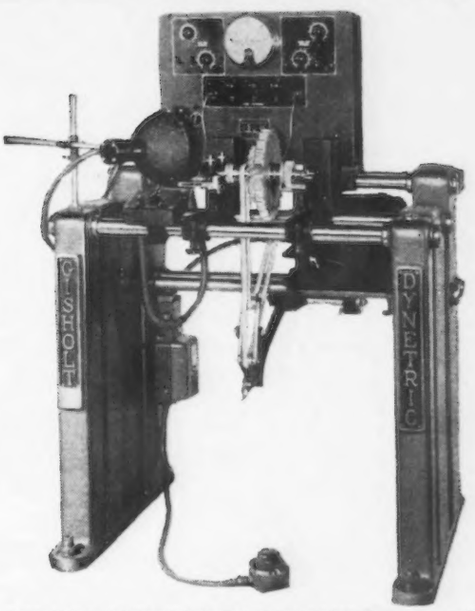
But they do more than that—they insure smoother, more efficient performance. No matter what the job may be, they do a better job. That's important—not only from the user's standpoint but from the manufacturer's as well.

Balancing Departments, like that pictured above, handle this work quickly and economically when they are equipped with Gisholt DYNETRIC Balancing Machines. They put balancing on a mass production basis. And they provide a degree of accuracy which cannot be equaled by any other means.

GISHOLT MACHINE COMPANY
Madison 3, Wisconsin

**DYNETRIC is a Trade-mark Reg. U. S. Pat. Off. by Westinghouse Electric Corporation.*

†Developed jointly with Westinghouse Electric Corporation.



GISHOLT DYNETRIC TYPE S BALANCER—*one of many sizes and types available to handle parts from a fraction of an ounce up to many tons. Locating and measuring unbalance requires but a matter of seconds. Where practical, correction equipment can be included as a part of the machine. Write for complete details.*

TURRET LATHES • AUTOMATIC LATHES
SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing, and balancing of round and partly-round parts. Your problems are welcomed here.*

to 10 tons per day. The price we quote for the unannealed powder is higher than for annealed powder. This is the result of a competitive situation in the industry. The high price of unannealed powder may be attributed to the relatively small demand for this product in view of the coming low price for annealed powder. Competition in certain applications exists with the Swedish sponge iron powders now being delivered duty paid at New York for 7.4¢ and 8¢ per lb in carload lots. Electrolytic iron powders are used for the production of permanent magnets, magnetic cores, pole pieces, bearings and other machine and ordnance parts. Each producer has established his own specifications for electrolytic iron, but in general, they contain 99.6 pct iron.—Ed.

RUST-INHIBITING SURFACE

Sir:

We would appreciate receiving a reprint of "Degreasing and Rust-Inhibiting With Infrared" as it appeared in the May 15 issue, p. 51.

CLAUDIUS NIELSEN
Research & Consulting Chemist
Nielco Laboratories
Detroit

METAL CUTTING EQUIPMENT

Sir:

One of our clients has asked that we contact you to obtain information relative to the number of plants or establishments in the U. S. which maintain metal cutting equipment of either torch or friction saw type. Only industrial types of establishments, such as steel fabricators, steel company warehouses, etc., rather than the smaller type of firm, are of interest . . . We will appreciate whatever data is available.

ROBERT L. BIGGS
President
American Research Service
Los Angeles

● There are 7000 metalworking plants performing welding operations and probably 5000 of these would have some torch cutting equipment. There are 2500 steel fabricators and these would be the major users of friction saws and gas cutting equipment. They are included in the welding departments mentioned above.—Ed.

LABORATORY INSTRUMENTS

Sir:

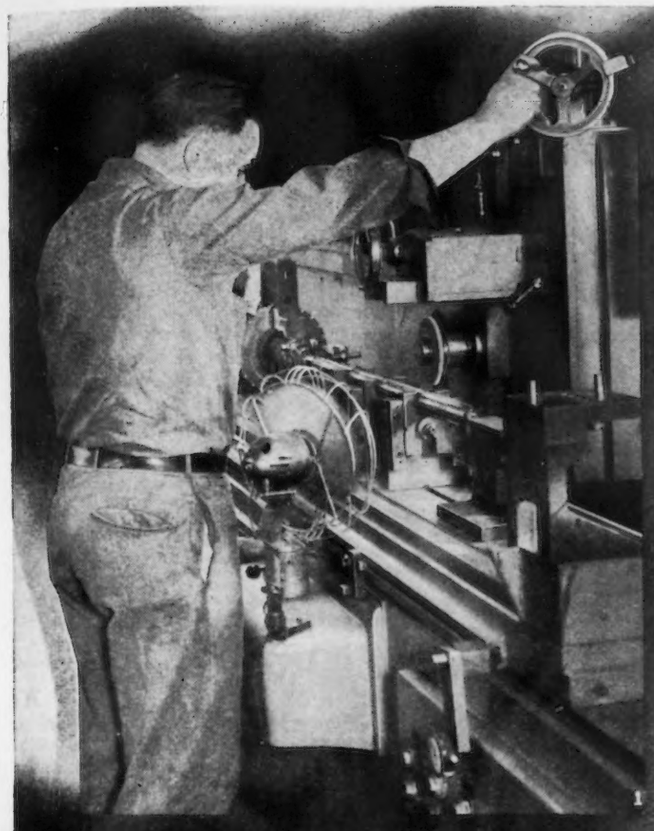
Will you kindly send me two reprints of "Basic Characteristics of Useful Industrial Laboratory Instruments" by J. S. Buhler of North American Philips Co., which appeared in the May 1 issue.

P. L. STAPELTON
General Electric Co.
Schenectady, N. Y.

TUMBLING CUTS COST

Sir:

In the English publication *Machine Shop Magazine* one of our clients read an abstract from an article in the May 1 issue of your magazine, en-



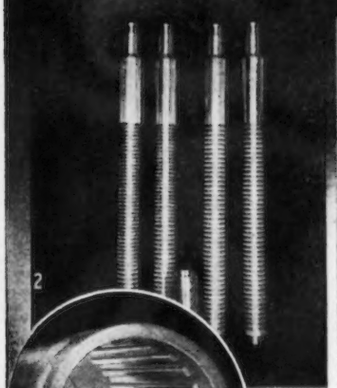
FOR BROACHES

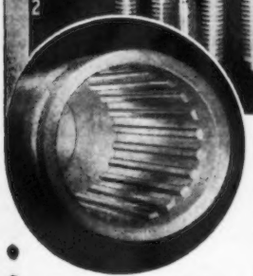
and for ALL Your Broaching Needs

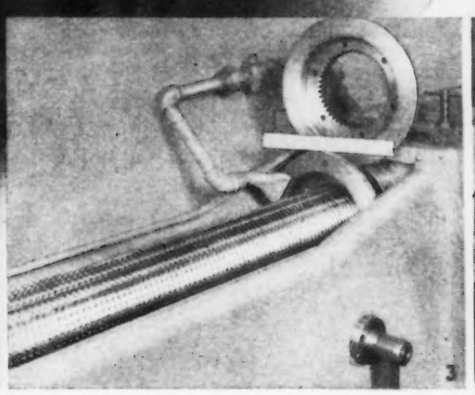
SEE *American* FIRST

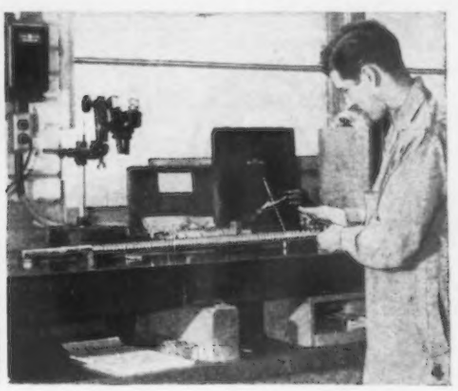
You are sure of greater satisfaction when you buy broaches from *American*. This is because of *American's* broad experience in all phases of broaching—machines, tools, fixtures, and engineering. This all around experience assures you of broaching tools that will give exceptionally long life at low initial cost.

See *American* first for all types of broaches: surface, round, spline, serration, hex, square, and formed broaches in any required size. *American* also manufactures pull and push heads for broaching tools of all sizes. And see *American* first for *everything* in broaching—machines, tools, fixtures, and engineering.









(1) Grinding a spline broach. All *American* broaches are ground by skilled broach makers to exceptionally close tolerances. (2) These four broaches, used in succession, cut 24 angular splines in steel airplane landing gear struts. Broaches are 65" long, and cut a spline section 12⅛" long by 4¼" I.D. Inset shows broached interior of part. *American* manufactures broaches of every size and variety, for the metal working industries. (3) This large broach, in a standard *American* H-30-72 Horizontal Broaching Machine, cuts 46 involute spline teeth in a bevel gear part. Size of broach is indicated by 12" rule shown with broached gear part placed on top of machine. (4) Checking a spline broach for spline width in *American's* Broach Inspection Department. Every broach must pass rigid inspection before shipment.

VISIT AMERICAN BROACH BOOTH 22

MACHINE TOOL SHOW

CHICAGO SEPT. 17-26

MEMBER BROACHING TOOL INSTITUTE

American BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN

•

BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

DIVISION OF SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS U.S.A.

titled "Modern Tumbling Techniques Cut Finishing Costs." Could you send us a cutting or perhaps reprint of the article?

W. S. SLACK
Director

Ashburners Ltd.
Manchester, England

LOW SULFUR FUEL OILS

Sir:

On the Newsfront page in the July 3 issue, there is a paragraph which reads "Currently steel mills require openhearth fuel oil containing less than 1 pct sulfur though other industrial consumers can use oil containing 2 or more pct sulfur. In view of critical fuel oil supply, studies are now under way looking toward use of the higher sulfur oils by making minor changes in openhearth nozzles, deflectors or exhausts." Any further information which you can give us at this time on the above subject would be greatly appreciated.

FRANK C. VEHSLAGE
Vice President

Phoenix Iron Co.
Phoenixville, Pa.

● **There is not a great deal of factual information on the subject available at the moment. Several mills in the Pittsburgh area are experimenting with oils containing 2 pct sulfur and over. The results to date look promising.—Ed.**

REQUEST FROM INDIA

Sir:

I shall thank you to send me tear sheets of the three part article "Metallurgical Applications of the X-Ray Diffraction Spectrometer" by John L. Abbott, appearing in the Feb. 13, 20 and 27 issues.

S. RAMAMURTHY
Research Metallurgist

Ms. Jyoti Ltd.
Baroda, India

METAL DISTRIBUTION

Sir:

Please send us a reprint of the article, "Metal Distribution From a Plating Bath," by J. B. Mohler and H. J. Sedusky, which appeared in the July 17 issue.

BERNARD P. PLANNER
Materials & Processes Engineering

Sperry Gyroscope Co., Inc.
Great Neck, N. Y.

LIMESTONE IN STEELMAKING

Sir:

We would appreciate your answers to the following technical inquiries: Do American steel works use crude limestone or burnt lime for their steel furnaces; which kind of furnace is to be used for burning of limestone for steelmaking purposes; the organization and output of lime burning-ovens; and in what manner and when is the lime added into steel furnaces?

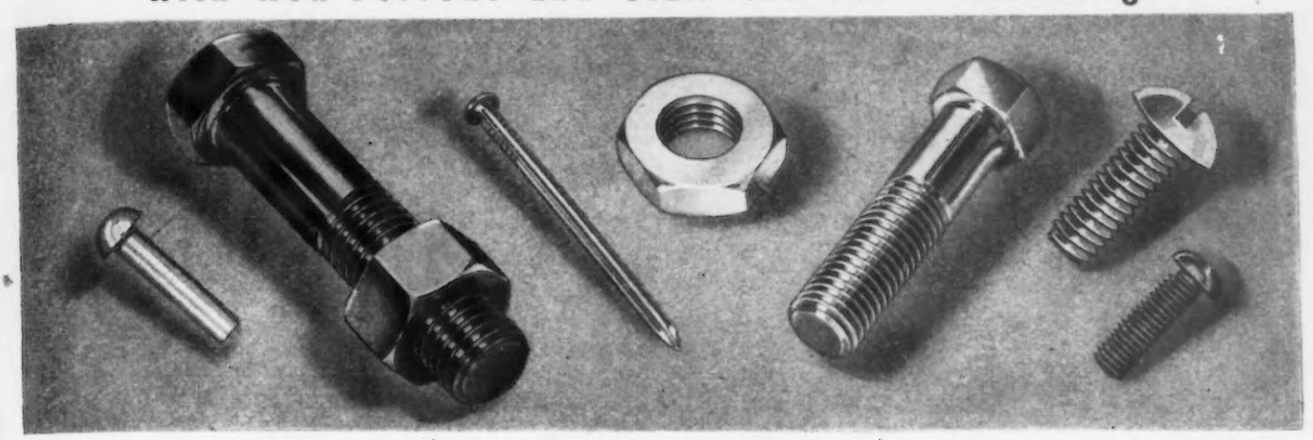
VITKOVICKE ZELEZARNY
Ostrava, Czechoslovakia

● **We are forwarding an article, "Basic Openhearth Slags," which appeared in the**

HARPER fastening NEWS

REDUCE CORROSION LOSSES

with Non-Ferrous and Stainless Steel Fastenings



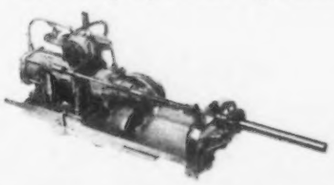
MONEL METAL BOLTS SIMPLIFY REPLACEMENTS

In butterfly valves ranging from small six inch diameters to huge 72 inch models for Utilities, Water Works and others requiring control of fluid systems, Harper Monel Metal bolts are used to fasten keeper segments which hold the rubber sealing seat in place. On occasion when the rubber needs replacement through wear the non-corrosive bolts are easily removed and reused on the new seat. Salt Water flowing through the system will not corrode these fastenings. Time, maintenance expense and breakdowns are thus eliminated.

Chain Operated Rubber Seat Butterfly Valve

FAVORITE DISH

Hamburger patties for the millions of American Hamburger fans are often handled and formed by machinery. A large manufacturer of such equipment specifies



Harper Stainless steel bolts, nuts and screws for strength, rust resistance and resistance to strong cleaning solutions.

5,200 Items In Stock

Bolts, nuts, screws, washers, rivets, nails and many other fastenings made from Brass, Bronzes, Monel Metal and Stainless Steels are available in reasonable quantity and in most items direct from stock—the largest anywhere. For all requirements where corrosion is a factor Harper non-ferrous and stainless steel fastenings save breakdowns and maintenance costs. Inquire today.

The H. M. HARPER COMPANY
2607 FLETCHER STREET.
CHICAGO 18, ILLINOIS

Branch Offices—New York City, Philadelphia, Los Angeles, Milwaukee, Cincinnati, Dallas, Cleveland

HARPER *Chicago*

HARPER SPECIALIZES IN EVERLASTING FASTENINGS

Mar. 7 and 13 issues which we believe will answer some of your questions concerning the use of limestone and lime in steelmaking furnaces. The book, "Making, Shaping and Treating of Steel," published by the Carnegie-Illinois Steel Corp., Pittsburgh, Pa., would serve as an overall reference volume on American steelmaking practice. Limestone commonly is burned in this country in oil or gas fired rotary kilns. We have asked a manufacturer of such equipment to forward to you literature describing his products.—Ed.

SPRAY BOOTH

Sir:

Please advise us where we can purchase a 6-in. wide water wash spray booth other than Binks or De Vilbiss. They both manufacture fine products but they do not give a delivery date.

MAX GINSBERG
Forgee's Metal Products
Philadelphia

● A list of possible suppliers of the equipment you wish, is being forwarded.—Ed.

HINGE MACHINERY WANTED

Sir:

It is my understanding that special machinery has been developed for the production of the hinge. Companies I have contacted can only supply the standard punching press or they are unable to supply the machinery. I want eagerly to have the special machinery to make 1 to 8-in. butt only including strap and T hinges. Will you please put my inquiry in your Dear Editor section?

C. K. CHANG
Braeburn Alloy Steel Corp.
Braeburn, Pa.

WASTE PICKLE LIQUORS

Sir:

In the article, "Analysis of Waste Pickle Liquor" appearing in the July 3 issue, I notice reference to several previous articles of a similar nature. One of these, "Disposing of Plating Room Waste Liquors" appeared in the Aug. 8, 1946 issue and would be of particular interest to us. We would appreciate it if you could forward us tear sheets.

V. L. BRADFORD
General Manager
Penn Rivet & Machine Co.
Philadelphia

10,000 TRADE NAMES

Sir:

We shall be obliged if you will kindly supply us with a copy of your Directory of 10,000 Trade Names, which we understand is available to subscribers.

K. SMITH
Climax Molybdenum Co. of Europe Ltd.
London

● The directory is now available to subscribers at a cost of $3.00 each for one or two copies; $2.50 each for three to nine copies; and $2.00 each for 10 or more copies. Your copy has been mailed.—Ed.